All you want to know about the BBC MICRO!

THE MICRO USER

Volume 1
Number 10
December 1983
£1

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Page graphics: 6845 revealed

Beginners' guide to string handling

Three BBC chess packages reviewed

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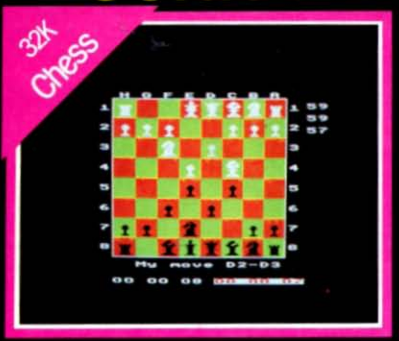
electron user

Software for the BBC micro

32K Chess

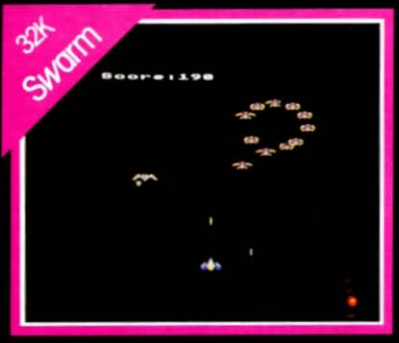


£8.95 incl.

Excellent use of the high-res graphics help to make this the most flexible chess game available. A choice of hundreds of different skill levels control the playing strength. This game has been continually updated over the past few years and this later version incorporates a host of new facilities, including the ability to: change the board and piece colours; replay a game, move by move; change levels whilst playing; ask the computer to suggest a move; force the computer to make a move at any time; save a game on tape or disc; blitz play within a time limit; mate in 2, 3 or 4 moves; castle and en passant.

Quite simply the best chess game available for the BBC Micro.

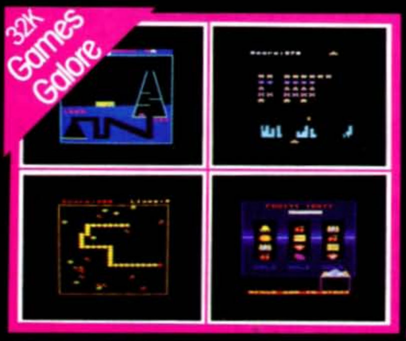
32K Swarm



£8.95 incl.

A formation of attacking birds control the sky. Your aim is simply to destroy the birds, bombs, eggs that hatch into diving eagles, this action packed game features exceptionally smooth graphics and novel sound effects. Joystick or keyboard operation.

32K Games Galore



£8.95 incl.

One cassette containing 4 arcade games.

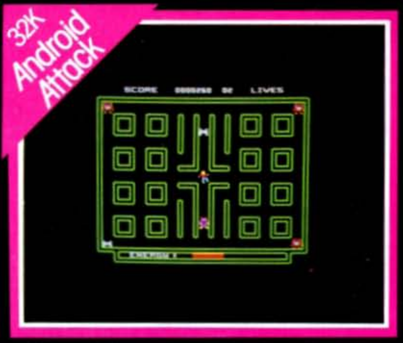
LOONY LANDER — Controls the rockets of a lunar landing craft as it descends to the moon surface. Try to land in one of the three permissible landing spots.

SPACE INVADERS — A fast machine code implementation of this old favourite.

FRUIT WORM — Controlling the direction of the worm, the object of the game is to eat the fruit that is littered over the ground but not the vegetables. The more you eat, the longer you become.

FRUIT MACHINE — Good sound effects and realistic high resolution graphics make this the best "One arm bandit" stimulation around. This tape represents exceptional value for money as it contains 4 full feature games normally selling as separate tapes costing £7.95 each.

32K Android Attack

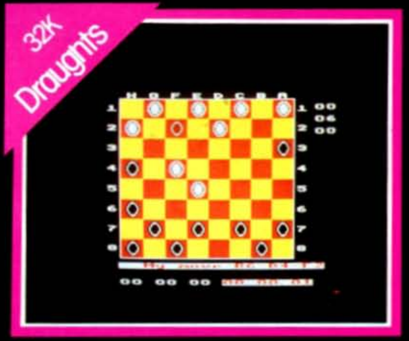


£8.95 incl.

You are in the middle of a maze being chased by various androids, your only weapons being your hand laser and a quantity of land mines. These mines can be dropped at any point in the maze and later detonated under remote control. Beware of the "Smiley" master android and watch your oxygen levels — the lower the level the slower you move. Many different skill levels and a high score table.

"The graphics and colour in Android, are excellent and the game has an appeal which is unique . . . One of the best games to appear recently . . ." Your Computer.

32K Draughts

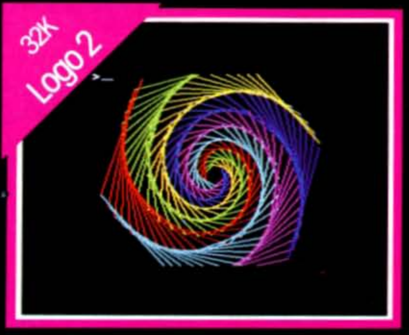


£8.95 incl.

From the same author as our best selling Chess program, this game incorporates many of the features of that program — various skill levels, save a game to tape, replay a stored game, etc. etc. A high resolution colour display (the user may change the colours) and an option to choose the rules of play make this game extremely flexible.

Works with all Operating Systems.

32K Logo 2



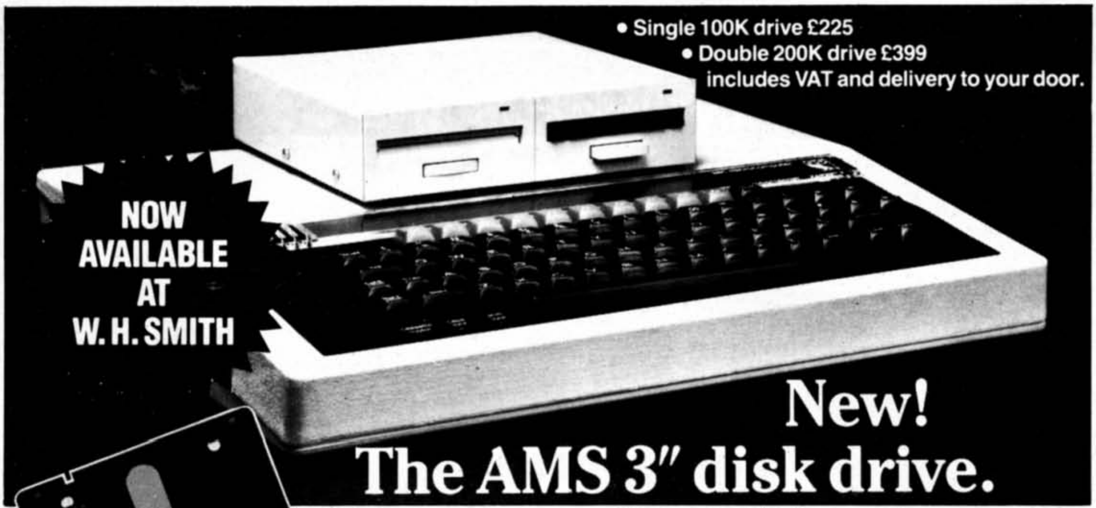
£11.50 incl.

One of our most popular programs to date. This is not a game, but an introduction to the LOGO graphics language that has become so popular in schools. It incorporates the 'turtle' graphics and many other features common to all LOGOS. Fascinating patterns or other graphics work can be built up very easily using the set of inbuilt commands. The command set can be extended by adding new 'words' to its vocabulary based on the existing set. Logo 2 can be used as a very simple graphics aid for young children, but it can incorporate more advanced ideas — defined procedures, sub-routines, loops and even recursive programming. Supplied with full documentation.

CASH OR ROYALTIES. We specialise in quality software for the BBC machine and can offer the best rates around. We are always interested in obtaining new programs to add to our range and offer either a cash payment for the outright purchase or alternatively pay a royalty on each one sold.

Computer Concepts

16 Wayside, Chipperfield, Herts WD4 9JJ. Telephone (09277) 69727



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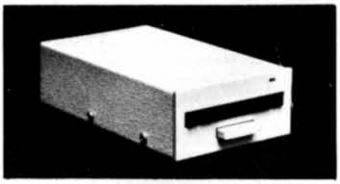

Reliable and robust
The Hitachi boasts a brush-less direct drive motor, the best possible system for trouble free use. AMS-3 units simply run off the BBC power supply – they don't need their own supply and there's no need to worry about corrupt data.
The standard interface lets you use the disk drive with most other computers in tandem with 5¼″ drives.

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The disk drive provides a track-to-track access time of only 3mS, much faster than old fashioned drives.
The AMS disk drive works with all DFS and disk upgrade kits.

Excellent Manual
Included with your drive will be an easily understood 80pp user guide, with full explanation of the BBC Disc Filing System (DFS).

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*Disk drives supplied by Hitachi Europe Ltd.

A+B Computing (Sept) stated – "excellent manual"... "its simplicity of use must recommend the Hitachi 3″ drive to anyone about to purchase a disk drive"... "the microdisk is a marvellous change" Personal Computer News "protective sleeve and hard plastic exterior provide for greater protection"... "far more durable and easy to handle than normal drives"

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I enclose a cheque for £ _______
or debit my credit card
No _______
Name _______
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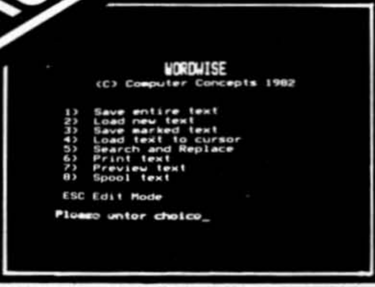
Signature _______
Please allow up to 28 days for delivery. BBM 12

ROMS

SOFTWARE FOR THE BBC MICRO



```
                WORDWISE
     (C) Computer Concepts 1982

  1)  Save entire text
  2)  Load new text
  3)  Save marked text
  4)  Load text to cursor
  5)  Search and Replace
  6)  Print text
  7)  Preview text
  8)  Spool text

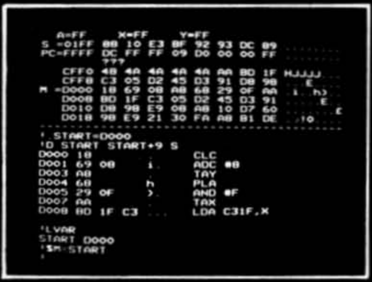
  ESC Edit Mode

 Please unter choice_
```

WORDWISE 32K

The renowned word processing package. Still clearly the market leader with sales now over 20,000. This has become "the standard" word processor for the BBC Micro and is still receiving very favourable reviews. Wordwise will work with tape, disc or Econet and includes automatic word counting and full control over text entered into the system. Supplied with a detailed spiral bound manual and an excellent free typing tutor program. After 8 months on the market there is still no other product as simple to use and as powerful as Wordwise.

£39.00 + £1.00 p&p + VAT



```
  A=FF     X=FF     Y=FF
S =01FF 88 10 E3 BF 92 93 DC 89 ........
PC=FFFF DC FF FF 09 D0 00 00 FF ........
        ???
   CFF0 48 4A 4A 4A 4A AA BD 1F HJJJJ...
   CFF8 C3 05 D2 45 D3 91 D8 98 ...E....
M =D000 18 69 08 A8 68 29 0F AA .i..h)..
   D008 BD 1F C3 05 D2 45 D3 91 .....E..
   D010 D8 98 E9 08 A8 10 D7 60 .......£
   D018 98 E9 21 30 FA A8 B1 DE ..!0....
-----------------------------------------
'.START=D000
'D START START+9 S
D000 18          .     CLC
D001 69 08       i.    ADC #8
D003 A8          .     TAY
D004 68          h     PLA
D005 29 0F       ).    AND #F
D007 AA          .     TAX
D008 BD 1F C3    ...   LDA C31F,X

'LVAR
START D000
'$M-START
'
```

GREMLIN 32K

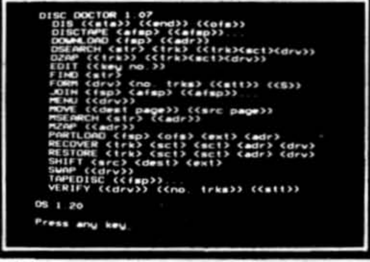
The GREMLIN system is a powerful de-bugging tool for 6502 machine-code programs. It includes all the usual features found in good machine-code monitors, such as memory search, intelligent memory move routines, memory editors etc. These work at byte, word or string level. A built in help menu can also be displayed at any time.

This ROM contains many more unique features such as an assembler as well as a disassembler. An extremely powerful expression evaluator is included allowing complex expressions to be entered in a format that is only normally available in high level languages. Variables are also allowed (any length) and may be included into expressions.

GREMLIN allows single stepping through machine-code programs. It is also possible (on to a printer or disc) to single step through graphic routines without disturbing the screen.

Supplied with full manual, this 8k ROM has more features than any other de-bugging package for the BBC machine.

£28.00 + £1.00 p&p + VAT



```
DISC DOCTOR 1.07
  DIS ((sta)) ((end)) ((ofs))
  DISCTAPE <afsp> ((afsp))...
  DOWNLOAD <fsp> ((adr))
  DSEARCH <str> <trk> ((trk><sct><drv))
  DZAP ((trk)) ((trk><sct><drv))
  EDIT ((key no.))
  FIND <str>
  FORM <drv> <no. trks> ((stt)) ((S))
  JOIN <fsp> <afsp> ((afsp))...
  MENU ((drv))
  MOVE ((dest page)) ((src page))
  MSEARCH <str> ((adr))
  MZAP ((adr))
  PARTLOAD <fsp> <ofs> <ext> <adr>
  RECOVER <trk> <sct> <sct> <adr> <drv>
  RESTORE <trk> <sct> <sct> <adr> <drv>
  SHIFT <src> <dest> <ext>
  SWAP ((drv))
  TAPEDISC ((fsp))...
  VERIFY ((drv)) ((no. trks)) ((stt))

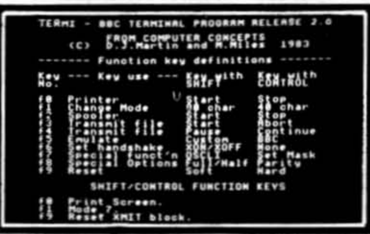
OS 1.20

Press any key.
```

DISC DOCTOR 32K

This utility package has many special features for use with discs but also contains many other utilities that everyone will find useful: Function key editing, powerful disassembler, recovery of any data from the disc, merging of files, complete disc editor. Compatable memory editor, String search in memory or on disc, automatic tape to disc and disc to tape routines, built in help menus, formating of 35, 40 and 80 track discs, and also a special format that allows 60 files per disc.

£28.00 + £1.00 p&p + VAT



```
TERMI - BBC TERMINAL PROGRAM RELEASE 2.0
          FROM COMPUTER CONCEPTS
    (C)  D.J.Martin and M.Miles  1983
------- Function key definitions -------
Key --- Key use --- Key with  Key with
No.                 SHIFT     CONTROL

f0  Printer         Start     Stop
f1  Change Mode     80 char   40 char
f2  Spooler         Start     Stop
f3  Transmit file   Start     Abort
f4  Transmit file   Pause     Continue
f5  Emulate         Custom    BBC
f6  Set handshake   XON/XOFF  None
f7  Special funct'n OSCLI     Set Mask
f8  Special Options Full/Half Parity
f9  Reset           Soft      Hard
      SHIFT/CONTROL FUNCTION KEYS
f0  Print Screen.
f1  Mode 7.
f9  Reset XMIT block.
```

TERMI 32K

This program enables the BBC machine to act as an advanced terminal when connected to another computer or to a modem via the RS-423 (RS-232) interface. This provides facilities to transmit data from disc and the spooling of data from the 'line' to the disc or printer.

Termi has 3 modes of operation — dumb terminal, BBC graphics terminal and customised intelligent terminals including DEC VT52.

£28.00+ £1.00 p&p + VAT

* Forthcoming GRAPHICS ROM

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STOP PRESS – REPLICA II NOW AVAILABLE

In addition to the features below it also works with Acornsoft "locked" programs plus very long programs (HEX &E00 to 7B00)

REPLICA II and THE KEY give you, the user, what you want. You have bought your disc drives and now want to take advantage of them, but most of your favourite software will not run with the disc interface and even if you are prepared to pay out for disc versions of everything you can't get them and if you have 80 track drives you might as well give up. If you know everything about the DFS, memory locations, saving procedures etc, you can probably save some of them onto disc. What's a half hour per program, and it only takes a few minutes to find, load and relocate it each time (if you can remember the sequence).
On the other hand you could buy REPLICA, enter a few details i.e. 1) program name, 2) number of sections, 3) CHAIN, *RUN or *LOAD 4) press play and then make a cup of tea whilst the program loads from cassette for the last time. When you return the program will be on the disc and shown in a menu under the name you gave it. There are now only two alternative storage methods required and one of them will work with most programs. There are some exceptions to REPLICA II but the number is insignificant. Many users have purchased 4 or 5 copies of REPLICA and it is now the recognised format that dealers use to display their software.
REPLICA II will now hold up to 16 programs on each disc, they can be erased if required and a new batch saved, but why not just buy another REPLICA and keep your programs on disc permanently (it only costs approx. £1.00 per program).

REPLICA II **£12.00** (state 40 or 80 track)

THE KEY

THE KEY provides you with the facilities that should have been included in the Disc Filing System and also helps you reach the parts other discs can't reach. This new version of THE KEY has been made compatible with ECONET at the request of many schools, colleges and universities. The whole program has been turbocharged and the facilities are:

1) FORM40 – now much faster.
2) FORM80 – now much faster.
3) BACKUP – has that effect on some people because it allows even most of the protected discs to be backed up – faster too.
4) EDITOR – display, read and alter sectors, even if you can't list the program. Highlight any byte whilst searching, make additional searches, edit bytes – now allows entry in HEX or ASCII and in string format. Dump a sector to printer, file pointers etc etc. You can now see how data is stored on a disc and alter it if you wish. Of course, it's also faster.
5) RETRIEVE – don't despair when you have a corrupted disc or if a program is accidentally deleted, using RETRIEVE your worries are over.

With so much from one utility it is no wonder that THE KEY is outselling programs that cost the same but provide far less.

THE KEY **£12.95** (state 40 or 80 track)

GRAFKEY/GRAFDISK

The first and best CAD program for the BBC Micro. Used in education, business, art, video etc. Recommended by LASERBUG, BBC MICRO USER, PCW, SOFT and thousands of satisfied users (see earlier issues of BBC Micro User for screen pictures). In a comparative review of the major CAD programs PCW said: "Considering the options it is by far the best value". Need we say more, if you need a graphics utility then this is it.

GRAFKEY (joystick & keyboard) **£9.00**
GRAFDISK (state 40 or 80 track) **£12.95**

SHADOW

A tape cloning program that will enable you to make security back ups of your valuable cassette based software.
SHADOW works with 99% of all known programs including those with "locked" sections or those containing 300 BAUD sections. Handles programs of any length and works with any operating systems.
SHADOW is the definitive tape backup system. Also on the same tape is a very useful program called "INSPECTOR" which allows the user to page through memory, search for a string, etc.
BOTH PROGRAMS £8 incl.
(This program for personal use only).

JOYSTICK UTILITY

Converts non-joystick programs to work with joysticks. Works with any program using INKEY(-), which applies to most programs. Easy to use, just press the keys you want to transfer. Supplied on cassette but can be transferred to disc.

CASSETTE **£6.00**

SINGLE KEY ENTRY

Requires 1.2 O.S.

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INTRO – A simple programming language which uses the immediate visual response of "Turtle" graphics to introduce a number of programming concepts and techniques. Cassette (and 9 page manual) £10.00

PROGRAMMERS

We are constantly seeking new and interesting programs. Why not send yours for appraisal? You have got nothing to lose but much to gain – So why not send your program today? 40 track disc if possible or two copies on cassette. In some cases we will even provide disc drives against future royalties.

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Vol. 1 No. 10 December 1983

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Published by:
Database Publications Ltd,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.

Subscription rates for
12 issues, post free:

£12 – UK
£13 – Eire (IR £16)
£18 – Rest of world (surface)
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Distribution to the news trade in the UK and Ireland is by Wells Gardner, Darton and Co Ltd., Faygate, Horsham, West Sussex RH12 4SU (tel: Faygate 444). Enquiries regarding overseas distribution should be made direct to the publishers.

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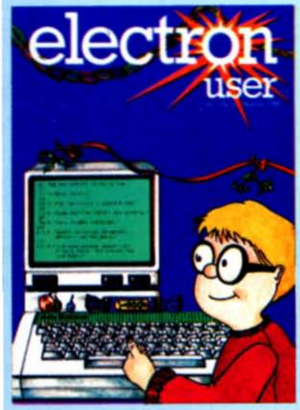

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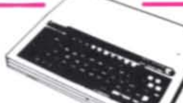

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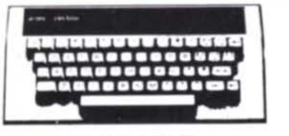

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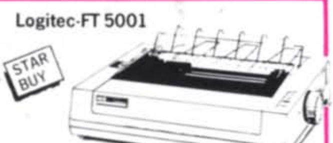

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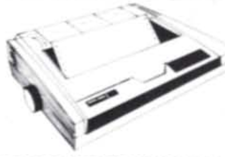

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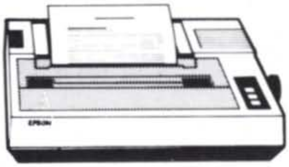

Epson FX80 F/T	£425
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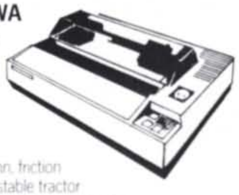

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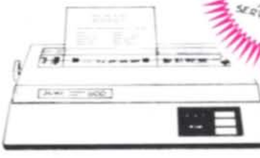

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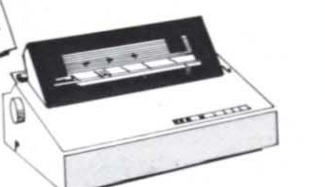

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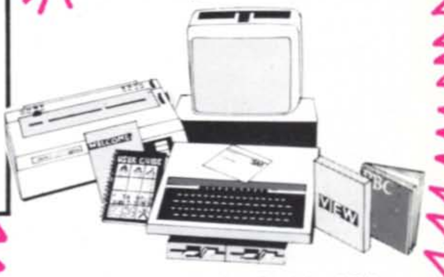

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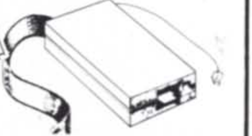

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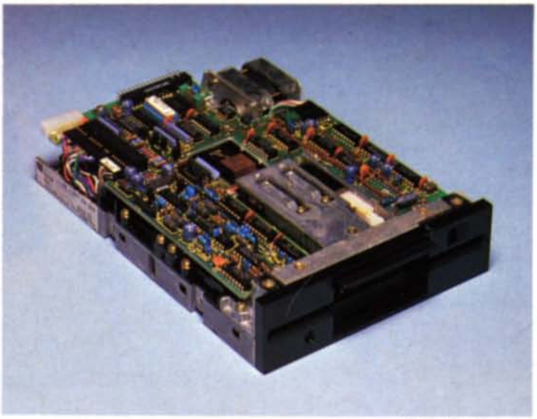

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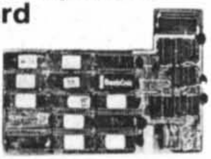

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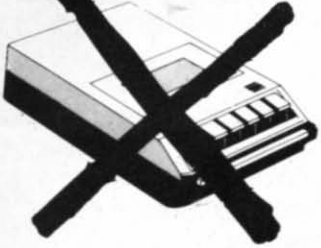

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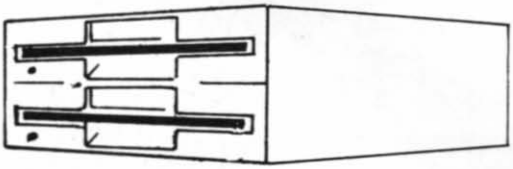

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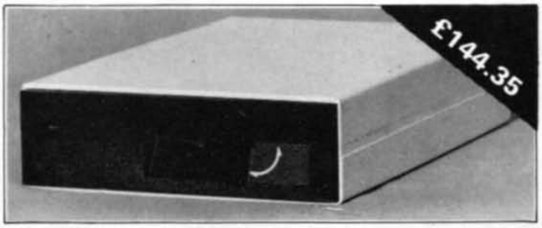

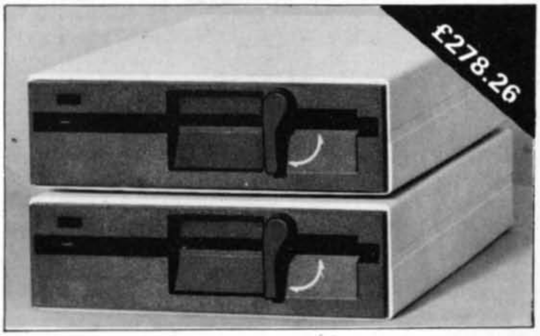

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TORCH

The BBC Model B microcomputer is widely recognised as an impressive first computer for the home or the school, but its capabilities are restricted by its lack of data storage and the limitations of Basic for serious programming. For the user who needs more from this computer the Torch Z80 Disc Pack is a gateway to the world of advanced computing.

The Torch Z80 Disc Pack will upgrade your Model B micro to a full business machine, offering the use of more powerful and flexible languages such as Fortran, Pascal, BCPL and Cobol, while twin 400K disc drives provide a massive storehouse for information and rapid data transfer from disc to processor.

DISK No.
TYPE MF 7201 CCI
DOC
DISK 2

The Disc Pack includes a second processor – the proven and reliable Z80 which powers Torch's highly acclaimed C-series business computer. The Z80 co-operates with the Model B's own 6502 chip, delegating screen and peripheral handling to provide faster access speeds than any other comparable disc drive system.

In addition to accepting the BBC's extensive range of software, the Z80 Disc Pack supplies Torch's own CP/M®– compatible Network operating system, based in Read Only Memory (ROM). This advanced design means that almost all of the 64K of Random Access Memory (RAM) provided on the Z80 board is available for CP/M programming use – an advantage that no other BBC micro upgrade can offer.

If your BBC micro has the Econet® option, there is a further benefit the Z80 Disc Pack can provide. Torchnet can link together up to 254 upgraded Model B's on a local area network, so for enthusiasts' clubs and schools it is a simple and low-cost way to set up a local area network.

At only £730* including installation at your dealer, the Torch Z80 Disc Pack offers real value for money. It is supplied with an impressive package of software including the PERFECT® range of business software comprising Perfect Writer (word processing) Perfect Filer (database management) and Perfect Calc (advanced, powerful spreadsheet). Add to that COMANEX,® the interactive management game, approved and used by leading Management Consultants – and you have a software package valued at over £1,000.

The Torch Z80 Disc Pack is a proven and cost-effective way of increasing the computing power of your BBC Model B micro, so if you are ready to take a step into the world of serious computing, contact your local dealer, listed on the facing page.

t to a BBC micro.

Z80 DISC PACK

Torch Z80 Disc Pack. Technical Specification. 4MHz Z80 Application processor · 64K RAM · 16K ROM · Torch MCP (8K CP/M compatible operating system with Networking in firmware) · Disc interface lead · 2MHz BUS lead for Tube socket · Low voltage PSu output · Perfect Software comprising: 1. Perfect Writer – word processing · 2. Perfect Filer – database management · 3. Perfect Calc – financial spreadsheet · 4. Perfect Speller – spelling checker · Comanex® – interactive management gain · Torch CPN CP/M compatible O/S disc utilities (Pokedisc, Mapdisc) music system (Muscmpx, Music) · Miscellaneous utilities (Font, RdAcorn, Torchbug etc)
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UCSD p-system available from I.S.V. Languages available Cobol, Forth, Fortran, Lisp, Pascal, Pilot, Basic, Prolog, BBC Basic (Z80), BCPL, C(Z80)

Torch Computers Limited, Abberley House
Great Shelford, Cambridge CB2 5LQ
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*RRP £730 ex VAT.

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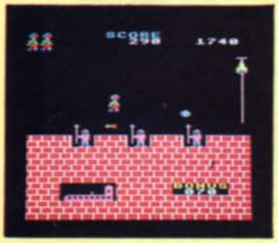
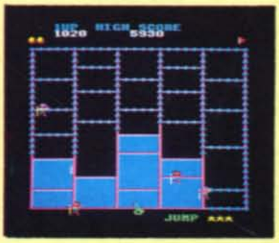
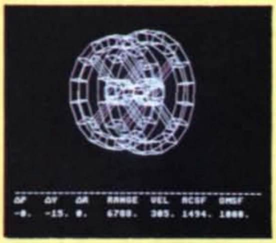


HUNCHBACK (32K) £7.95
An excellent version of the arcade game where Quasimodo attempts to rescue Esmeralda. Beautifully detailed animation (the best we've yet seen!) as Quasimodo leaps over the ramparts dodging rocks and arrows, swinging on ropes, avoiding the guards' spears, and ringing the bells. Twelve different screens of action! This program is sold under licence from Century Electronics Ltd; we have exclusive rights to its sale for use on the BBC micro.
(For use with KEYBOARD or JOYSTICKS).
●●● *NEW RELEASE* ●●●



CRAZY PAINTER (32K) £7.95
The only full-feature version available for the BBC micro. On the first screen, you take the part of a monkey being chased by African tribesmen. If you manage to survive by painting-in all the squares, the bonus screen features the monkey trying to reach his bunch of bananas. After that, you take control of a paint-roller and each square painted-in adds to your score. But beware . . . the teddy-bears are now in hot pursuit. Superb animation and sound-effects.
(For use with KEYBOARD OR JOYSTICKS).
●●● *NEW RELEASE* ●●●



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A space docking simulator using a 3D graphics to model the motions and responses of the ORION 4 spacecraft. Your mission is to pilot the shuttle to a "soft dock" with the space station. PITCH, YAW, ROLL, FORWARD, LATERAL and VERTICAL engines are provided together with orbit manoeuvering booster engines. 6 skill levels provide for the completely inexperienced pilot as well as the fully-fledged commander.
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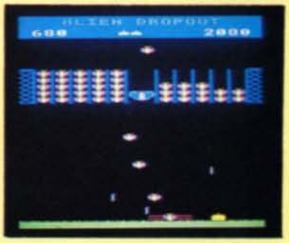

ALIEN DROPOUT (32K) £7.95
A novel and unusual program. Arcade-action with this exciting multi-stage shooting game. You have to shoot the aliens out of their "boxes" before the "boxes" fill up. Once full, the aliens fly down relentlessly, exploding as they hit the ground.
(For use with KEYBOARD or JOYSTICKS).
". . . these moths are out to get more than the clothes in your wardrobe.
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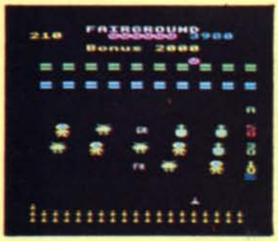
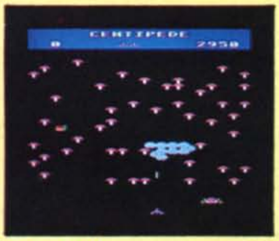
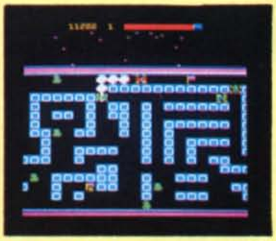


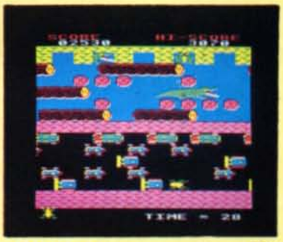
FAIRGROUND (32K) £7.95
An exciting target-shooting game! Bonuses are scored for spelling out the word FAIRGROUND by hitting the appropriate target letters, and for shooting all the targets. Extra bullets are obtained by shooting the numercial targets, but watch out for the "smileys" who are intent on stealing your bullets. Music, sound effects, hi-score, and rankings.
●●● *NEW RELEASE* ●●●



CENTIPEDE (32K) £7.95
Incredible arcade-style game featuring mushrooms, snails, flies, spiders, and the centipedes of course. Excellent graphics and sound. 6 skill levels, hi-score, rankings, bonuses, and increasing difficulty as the spiders become more lively and the number of mushrooms increases.
(For use with KEYBOARD or JOYSTICKS).
"Visually this game compares well with the arcade version, being colourful and clear."
. . . YOUR COMPUTER



ROAD RUNNER (32K) £7.95
The only full feature machine-code version available for the BBC micro. Features include: scrolling screen, radar display, 3 pursuing cars, checkpoint flags, fuel gauge, smoke screens, 6 skill levels, rankings, increasing difficulty, and sound effects.
(For use with KEYBOARD or JOYSTICKS).
"The game becomes very hard and has very smooth graphics. Excellent." . . . BEEBUG MAGAZINE.



FROGGER (32K) £7.95
Not just another version of Frogger . . . this is the arcade-action version that you've been waiting to see. Graphically brilliant with gaping-mouthed crocodiles, diving turtles, flies, and frogs that flex their legs as they jump along. Increasing difficulty, and responsive controls.
(For use with KEYBOARD or JOYSTICKS).
". . . very good indeed . . . fast flicker-free graphics and a frog that really hops!" . . . BEEBUG MAGAZINE

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(2) All our software is available before we advertise.
(3) All our software is despatched within 48 hours by first-class post.
(4) In the unlikely event that any of our sofware fails to load, return your cassette or disc to us and we will immediately send a replacement.

THE MICRO USER NEWS

December 1983

ROBOTICS ARE ON THE MOVE

THE manufacturers of the Zeaker, Colne Robotics, have had a boost to their expansion plans with a £200,000 capital investment from the Prudential. This is in addition to an earlier £150,000 injection.

The Zeaker, a low cost robot for the BBC Micro, is aimed at the educational market.

New products from the firm will include a solid state computer vision system and a computer controlled lathe suitable for colleges of Further Education.

Micro link on show

PRACTICAL demonstrations of an inexpensive way to link up two BBC Micros will be one of the features of the BBC Micro User Show, to be held at the Westminster Exhibition Centre from December 8 to 11.

Experts on the *Micro User's* technical advice stand will be explaining the procedure, which was described in detail in the October issue.

The method outlined in the article has aroused a flood of interest and many users are now working on ways of incorporating it into games and other programs.

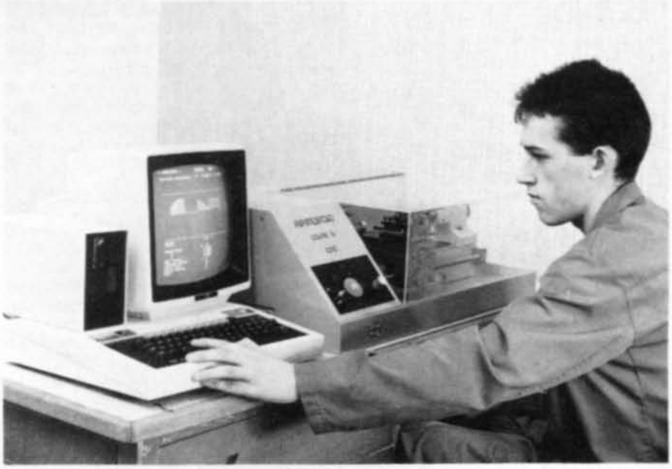
The show will include a number of specialist stands designed to give the BBC Micro user the most up-to-date information about his computer.

The government-backed Micro Electronics Project will be displaying all the latest in the world of educational computing.

The BBC themselves will be demonstrating their recently-launched telesoftware service, and our highly popular walk-in forums will include talks by some of the country's leading experts on the BBC Micro.

Scores of firms will be displaying their new products for the BBC Micro and Electron, many for the first time in public.

Latest to announce a launch at the show is R.H. Electronics. They will be releasing a range of software and hardware products, including a video digitiser.



The BBC Micro controlling a small lathe

Software floods in for Christmas

Accent is on education

CHRISTMAS is coming, and so is a flood of new software for the BBC Micro.

Encouraged by the huge sales of BBC Micros to the schools, new software companies have been proliferating – mostly set up by publishing houses.

One of the most prestigious companies to enter the field is Cambridge University Press. They have joined ranks with Netherall School, the latest of our educational institutions to succumb to the lure of the software market.

Not to be outdone, Longman, another of the establishment publishers, have joined with Loughborough Primary Micro Project to produce a range of educational titles aimed specifically at the home market.

Shiva Publishing has also chosen the Christmas season to launch a suite of four educational programs. Designed for five to eight-year-olds, the programs teach basic mathematical concepts.

Even the publishers of Cosmopolitan, the National Magazine Company, have entered the market. Their company, Ebury Software, has launched a series of six titles aimed at the pre-school and infants market.

Reversing the trend somewhat, H & H, specialists in educational software, has announced the launch of its first arcade game – Looney Lift.

Presumably, after all that worthy educational work, they were glad to let their hair down.

Choice is Xenix

THE long awaited 32 bit second processor from Acorn will have Xenix as its operating system. Xenix is a version of Unix, an operating system that has gained wide acceptance in the world of mainframe and mini computers.

Logica UK will be adapting the system for Acorn.

Now – a 3D game

WHAT is claimed to be the first truly three dimensional computer game has just been released by Postern.

"3-Deep Space" requires the use of special 3-D glasses which come with the package. When wearing them the games graphics characters seem to pass in front of and behind each other, appearing to move in and out of the screen.

Postern claims that this opens up a new dimension in computer software.

Radio boost for new technology

NEW YEAR will see BBC School Radio entering the field of the new technology with two series of educational broadcasts aiming to introduce youngsters to the basics of electronics.

This has been done in cooperation with the Microelectronics Education Program (MEP) and the Department of Industry.

Software to accompany one of the series is currently under development by King Alfred's College, Winchester, and the MEP.

It is intended that at least a part of this software will be available over the BBC's Telesoftware service in the New Year.

This can then be downloaded via the BBC Micro's Teletext Adapter, saved, and used in lessons.

Horizons

Speaking at a preview of the programmes, Claire Chovil, Head of School Broadcasting, Radio, said: "The age of technology opens up new horizons for our children. The education we give them must prepare them for the opportunities which it will offer".

Despite this growing realisation that children have to experience the new technology in order to prepare them for the future, there is a shortage of suitably trained teachers.

Expand

To aid this situation both series are designed for teachers with little or no electronics knowledge. The more experienced will be able to expand on the programs, including them in their own lessons.

The first series, "Junior Electronics", is aimed at introducing the 9 to 12 year old age group to the elementary concepts of electronics.

The second, "Microtechnology", is designed for 14 to 16 year olds and should be relevant to the current O-level sylabuses. A basic knowledge of electricity is assumed.

Guiding

The emphasis is very much on learning by doing, the radio programmes guiding the children through practical experiments which can become the basis of a week's work.

The intention is that the programmes will be taped and used as needed in the classroom, each group of children learning at its own pace.

Both series have a special kit of components available for the children to use although the BBC are quick to point out that there is nothing to stop teachers making up their own packs.

For the microtechnology course there is also a breadboard and a bench power supply available.

There is a DoI subsidy on the first kit ordered for each school, showing the importance placed on this education for the electronic society of the nineties.

Junior Electronics

Five weekly broadcasts. Tuesday 2.20-2.40 Radio 4 VHF. First broadcast February 28, 1984.

Kit of parts and filmstrip available.

Microtechnology

Ten weekly broadcasts. Friday 10.45-11.05 Radio 4 VHF. First broadcast January 20, 1984.

Kit of parts, filmstrip, and breadboard available.

Slimline disc drive is on way

FOLLOWING the successful sales of BBC Micros in High Street shops, Cumana, one of the UK's leading floppy disc drive distributors, has decided to enter the same market with a slimline disc drive.

The 5¼ inch disc drive comes complete with user manual, 2-drive connecting cable and a formatting disc.

Available in single sided 40 and 80 track, and double-sided 80 track formats, each drive comes with mains power supply lead and plug.

This will be the first time that a computer peripheral has been sold in this way.

The emphasis is on providing both retailer and consumer with an attractive, easy-to-understand package. So the next time you buy *The Micro User* you might be able to get a disc drive off the same shelf.

More titles adapted for BBC

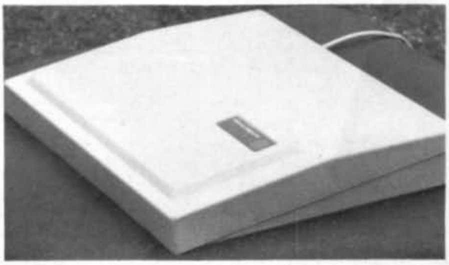
THE ever-increasing sales of BBC Micros have caused major suppliers of software for other machines to adapt their programs for the BBC Micro.

Microdeal, one of the foremost software producers for the Dragon has converted its best-selling Shuttle program for the BBC Model B. Also released at the same time is their Air Traffic Controller.

Four titles for the BBC Micro aimed at the Christmas market have been launched by leading Spectrum software house, DK Tronics. Their Slicker Puzzle, considered to be as compulsive and infuriating as the Rubik Cube, is tipped to be a best seller.

Also translated from the Spectrum is The Hobbit, Melbourne House's adventure based on Tolkien's novel, a copy of which is included with the game.

Extremely successful in its Spectrum version, the BBC Model B reincarnation has been eagerly awaited.



Taking the brunt

A HARD cover to protect your BBC Micro from the depradations of children, spouses and twentieth century life in general has just been released by Tekform Products.

Made in high impact ABS, the cover's cream textured finish matches that of the BBC Micro. With anti-slip foam pads on the underside to further protect the micro, the cover is expected to sell well to educational and domestic users.

Micro plays lead

A BBC Micro is the star of a science fiction play being performed by pupils of Moorside High School, Manchester.

The play, "The Adventures of Harry Willetts, Cargo Pilot" is set on a spaceship in the near future. This has its own computer, Doris, played by one of the pupils sitting in a metal tank with only her head protruding. Doris is considered one of the crew and can answer any questions put to her.

The BBC Micro works closely with Doris. It is linked to a specially hired 45 inch TV and provides text and graphics displays to coincide with Doris' speech.

The idea of using the micro came from the play's producer, English teacher Alan Liptrot. He enlisted the aid of fifth year pupil David Pearson whom he describes as a "computer whizz-kid" to write the software.

"It started off as a small part of the production but now the BBC Micro has become the star", he said.

Teachers launch software house

THREE North West teachers have turned their backs on classrooms to have more impact on the educational front.

They have pulled out of their schools in order to help launch a new software house – Optima – based in Stockport, Cheshire, which they are convinced will enable them to communicate far more effectively with schoolchildren than traditional teaching methods.

All three teachers – Peter Davidson, 32, Chris Price, 33 and Trevor Roberts 33 – are graduates and between them have teaching experience which ranges from primary schools through to sixth form colleges.

"We have not abandoned the kids but are simply adopting a new approach", said Peter Davidson, Optima's software development manager.

"What we are doing now will be far more meaningful than what we were able to achieve in the limitations of the classroom system".

Optima Software's first wave of products include two programs tailor-made for schools across the country.

Datext, an easy to use teletext editing and library program, provides multi coloured worksheets suitable for anything from sixth form science experiments to nursery rhyme books for infants.

Monitor

The newly-formed software company is also offering Optimon, a full machine code monitor which can be utilised as a learning tool for more advanced students.

It eliminates time consuming and unnecessary tasks and instructs the youthful programmer on machine capabilities.

Although the main thrust of Optima's activities will be on the educational front, games will also figure prominently on its product list.

It has already received welcoming reviews for Asteroid Miner, Sea Wolf and Atomic Protector which it recently unveiled for the Christmas market. Other titles are scheduled to appear shortly.

"We aim to be a complete software house", says Peter Davidson. "But we obviously feel that we have that little something extra to offer in the educational field because of our teaching backgrounds".

BRT picks BBC

BRT, the Belgian Dutch-language television service, is halfway to completing an educational series scheduled to begin in January.

There will be 12 half hour programmes, using the BBC computer, and these will be linked to a study course of textbooks and cassettes.

Acorn sponsors world chess championship semi-finals

ACORN has pulled off Britain's largest chess sponsorship deal by sponsoring the semi-finals of the world chess championships to the tune of £100,000.

The deal, which allows the British Chess Federation to stage the matches in London, was made in the face of rival bids from Holland and Austria.

"It's all come as a bit of a rush", said a spokesman for the BCF.

"As yet we haven't arranged a venue for the games though they should start at the end of November and last for a month".

Acorn's sponsorship of the two matches is a coup for Britain after earlier arrangements had fallen through.

The game between the Russian Gary Kasparov and Russian defector Victor Korchnoi was to have been held in California until Kasparov, complaining of security problems, refused to travel there.

Similarly, the game between the veteran Russian Smyslov and Ribli, the Hungarian, which was to have been held in Abu Dhabi, was cancelled because of the heat.

The offer from Acorn solves all these problems, allowing the series to go ahead.

RECOMMENDED..

The two teach-yourself computing books recommended by the BBC in the weekly TV series "The Computer Programme" can now be obtained from *The Micro User*.

They are "The Computer Book", by Robin Bradbeer and "The Friendly Computer Book", by Jonathan Inglis.

They can be ordered using the coupon on Page 122.

Keeping tabs on Ferraris

A BBC Micro along with a Z80 second processor (on field trials) is being used to keep records of buyers and sellers for a Ferrari brokerage.

The firm, Compute-a-Ferrari, was founded in January by David Hunt, younger brother of the former world champion driver.

Software for the system was made by Acorn who also sponsor David Hunt in Formula 3 motor racing.

Detailed descriptions of Ferraris for sale are entered into the micro, covering 28 categories from the condition of the tyres and bodywork to interior marks – even cigarette burns.

Prospective buyers give details of the car they are looking for and the micro does the matchmaking.

The system has been so successful that there are plans to extend it to cover Porsche, Lotus and Aston Martin too.

The BBC Micro stars in Belgium

THE popularity of the BBC computer is not limited to the United Kingdom.

The BBC users group in Brussels is already 135 members strong and growing daily.

The club meets once a fortnight, is extremely active, and has its own monthly newsletter.

The distributor for Belgium and Luxembourg, Société Luxembourgeoise d'Informatique, is providing strong support for the club.

Expertise

A BBC Micro complete with discs and colour monitor has been placed on permanent loan with the group. A high level of expertise is available to beginners in both hardware and software.

One member is responsible for a 40/80 track disc switch which can be easily added to the BBC Micro and is featured in the new catalogue of Control Universal of Cambridge.

Micros in the cottages..

BRITAIN will return to a society based on cottage industries, says Richard Fothergill, Director of the Microelectronics Education Programme.

This, he says, will be as a result of the new technology.

He cited BBC School Radio's microelectronic education series, which he called "one of the more imaginative and innovative activities the MEP has been associated with", as an example of this tendency.

The series and their supporting hardware had been the result of cooperation between people and agencies spread across the country.

Two Newcastle housewives had designed the screen layout, while the MEP had provided the software.

Components

A "garden shed"-based supplier in Liverpool was providing kits of components, with another small manufacturer in Essex developing a power supply unit for the project.

This cooperation between small groups at a distance was, he felt, the blueprint of our future society. It would also become a major source of jobs for the young people who will make up that society.

More hardware from Acorn

TWO new pieces of hardware have been unveiled by Acorn.

The first is the Acorn Bit Stik graphics system, a development of the well-known Apple Bit Stik. This is an extremely sophisticated computer aided design package consisting of the Bit Stik itself (a type of super joystick) together with dedicated software.

The system allows the user to define, with the minimum of keyboard input, a whole library of designs which may be then combined in a variety of methods.

Particularly interesting is the zoom feature, which allows you to magnify a fraction of the screen. You can add details to that part of the design in high definition, then return to the standard magnification.

The system also permits images to be stored in a library and recalled at will. Said to be faster and to use less memory than the Apple version, the Acorn Bit Stik is one of the results of the company's new policy of buying-in products for the BBC Micro.

The second development promised is an IEEE interface for the BBC Micro.

This makes the machine the first computer of its type to have available all of the standard I/O ports – RS423, Centronics and IEEE.

Aimed mainly at the laboratory market in schools and industry, Acorn claim that this is the first full specification IEEE interface available for a micro.

Also supplied with it will be an IEEE language system which can be used to control the attached equipment. Said to be simple to use, the IEEE language can be accessed from Basic and used by most schoolchildren.

Light on data capture

A LIGHT pen claimed to be far easier to operate than others on the market has been launched by Datapen Microtechnology.

Said sales director Pam Rayner: "Most light pens on the market are difficult to use because the operator has little or no control over the pen's data capture as it approaches the screen.

"Our model has a LED readout showing that data is available. A switch built into the casing allows the operator to signal when the position is right".

The light pen, which comes with a range of software, retails at £25.

BARRY WOOD'S TAILPIECE

THE other day I caught our beloved editor reading a copy of a rival magazine – you know, the one for squirrels.

He grinned at me sheepishly and said: "I can't resist the delicious feeling of deja-vu it gives me".

* * *

I HAD a terrifying conversation with a software house this week. Their bright young chap said: "Our program's been tested on the 2.1 OS".

"Don't you mean 1.2", I glibly corrected him.

"Oh no", he replied, "our boss has got a friend at Acorn, and the one he got from him is higher than that".

* * *

WELL Mr Pike, we know your name, and we know you're a deputy headmaster.

What we don't know is your school, but we're quite confident that your pupils, who've been scrawling electronic graffitti over Prestel while you've popped out of the room, will inform us soon enough.

* * *

LAMEST excuse of the year award must go to our associate editor who was stopped by our gallant constabulary for speeding.

"Oh", said he, "I thought the 30 was in hexadecimal".

They let him off. Pity.

* * *

IT'S lovely to see that the teletext adapter is such a nice creamy beige. It will go so well with my collection of second processors and Electrons.

* * *

ACTUALLY we're all a bit miffed here because Acorn have poached our gorgeous marketing manager.

Come to think of it, I've heard that Acorn are after me . . .

* * *

"WHO told Barry Wood about our new DFS?" demanded a gentleman from Acorn of our less-than-gentlemanly editor.

"What new DFS is this?" enquired my unworthy superior. Exit Acorn man stage left.

So here's my project for this month. You've got to find the first Acorn spokesman to deny they're working on a new DFS.

* * *

THOSE electronic vandals probably got the idea from the hackers on Making the Most of the Micro Live.

I certainly can't see anyone getting anything else from it.

* * *

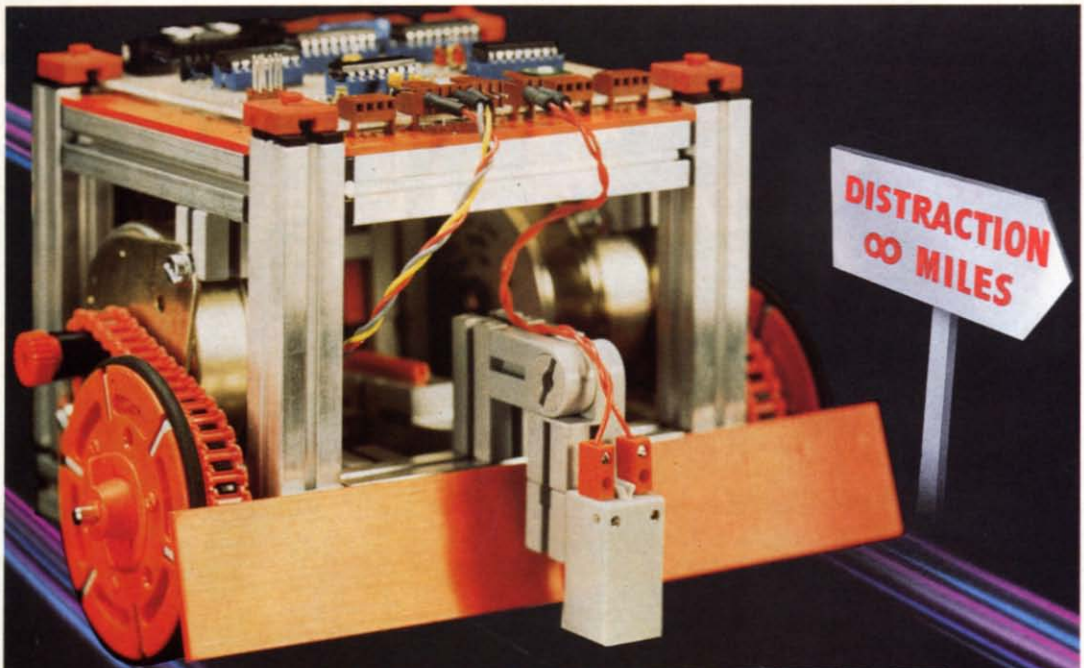
SO, we're going to have Xenix for the 16032. I just can't wait to get it up and running on mine.

Question is, is it Xenix 0.1 or Xenix 1.2?

* * *

SO Acorn are "computer modelling" race tracks so their car can go faster, are they?

Isn't it a pity that they haven't applied the same techniques to the Electron production lines?



DRIVE YOURSELF TO DISTRACTION

WITH A ***BBC*** BUGGY

Trying to determine the limitations of the BBC Buggy is a task which will drive you to distraction. So sit back and accept the fact that your BBC Micro computer (Model B) controlled Robot will provide you with hours and hours of stimulating entertainment.

This rugged little vehicle which has been designed in conjunction with the BBC Computer Literary Programme and featured in the television series 'Making the most of the Micro' is built from an easy to assemble fischertechnik construction kit, complete with all necessary cables, software and instructions.

BBC
ECONOMATICS

The Buggy's software which is based on the 'building block' principle consists of 12 robust application programs and one familiarisation program all of which feature full graphics.

Take a trip into the future without ever leaving your key-board – drive a BBC Buggy.

PROGRAMS
Test and familiarisation.
Switch – direct computer control.
Memory Switch – demonstrating computer memory.
Routeplanner – advanced version of Snail.
Recorder – route display.
Snail – screen route planning.
Explore for wall – mapping of boundaries.
Explore for object – seeks objects, defines shapes, returns home.
Bar Code Routeplanner – non-keyboard information input.
Tin Pan Alley – composing music by bar codes.
Man vs Buggy – 'Flying blind'.
Sunseeker – seeking a light and negotiating obstructions.
Line Follower – black or white line following.

The BBC Buggy is available from Acorn/BBC dealers and other major outlets.

BBC ECONOMATICS

Send me the
BBC Buggy at
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inc. VAT, packing and postage

Name

Address

I enclose cheque/PO or debit my Access account (delete as necessary)

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Signature

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Database Publications presents . . .

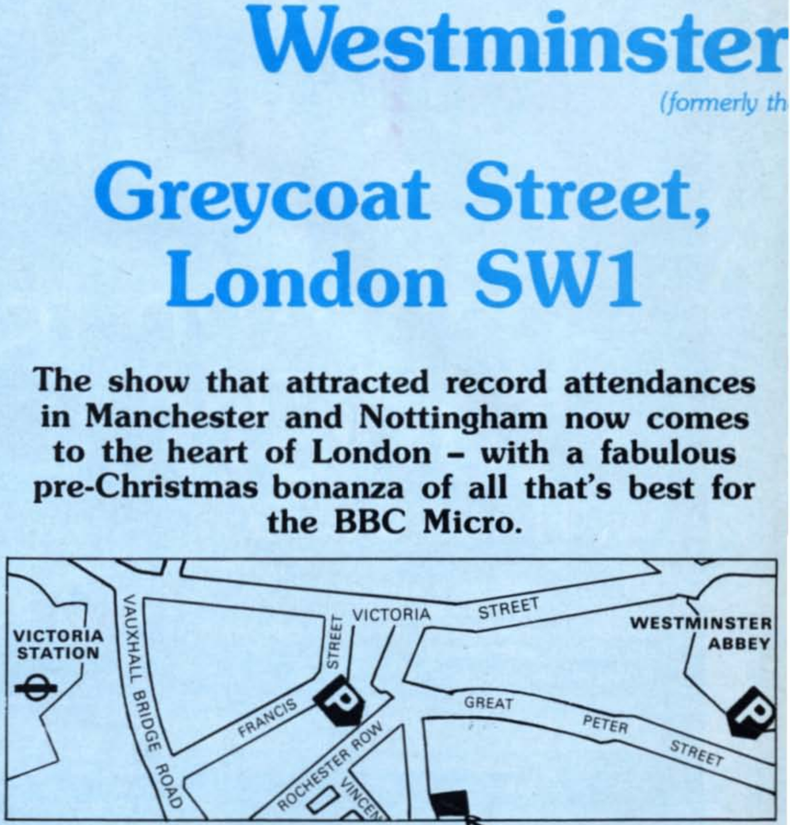
THE BBC MIC

Westminster

(formerly th

Greycoat Street, London SW1

The show that attracted record attendances in Manchester and Nottingham now comes to the heart of London – with a fabulous pre-Christmas bonanza of all that's best for the BBC Micro.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Exhibitors include:
Acorn Computers, Akhter Instruments, Advanced Memory Systems, British Micro, Bradford Office Supplies, Bucon Ltd, Computersolve, CJE Microcomputers, C-Tech, C.W.P., Clwyd Technic, Clares Micro Supplies, Cumana, Commotion, Economatic, Educational Computing, Electronequip, Education Software, Glengary Soft, Golem, Kirklands Computers, Kansas City Systems, L.C.L. (Ludinski Computer-Assisted Learning), Lowland Designs, Logic Sales, MGB Software, Micro Aid, Micro Power, Microware, Microage, Master Class, Microvitec, M.W. Systems, Miniature Tool Company, Opus Supplies, Oakleaf Computers, Oak Software, Proteus Computing, Pace Software Supplies, R.H. Electronics, Superior Software, SYSTEM, Twillstar Computers, Viglen Computer Services, Watford Electronics.

RO & ELECTRON USER SHOW

Exhibition Centre

Royal Horticultural Halls)

Thursday to Sunday, December 8 to 11

- **ASK the experts – free advice on all aspects of computing from people who know the BBC Micro inside out.**
- **CALL in to one of our highly successful walk-in seminars, at which all the famous names from the world of BBC Micro computing will be taking part. Whatever your interest – graphics, machine code, interfacing, education – there will be a top expert speaking on it. *(Saturday and Sunday only)***
- **TRY OUT for yourself the games that will be the top sellers this Christmas – and well into next year.**
- **FIND out about all the new peripherals for the BBC Micro – disc drives, interfaces, ROM boards, robots and second processors.**
- **DISCOVER why the Electron – the baby brother of the BBC Micro – has been hitting the headlines and why all the experts are tipping it to be the big seller of 1984.**

£1 ***off normal exhibition admission price of £3 (adults) and £2 (children)***

The BBC Micro User Show

10am - 6pm, Thursday, December 8
10am - 6pm, Friday, December 9
10am - 6pm, Saturday, December 10
10am - 4pm, Sunday, December 11

**Westminster Exhibition Centre,
Greycoat Street, London SW1.**

GROUP BOOKINGS

Schools can obtain additional tickets by sending a stamped addressed envelope to: BBC Micro User Show, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

£1 ***off normal exhibition admission price of £3 (adults) and £2 (children)***

The BBC Micro User Show

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10am - 6pm, Saturday, December 10
10am - 4pm, Sunday, December 11

**Westminster Exhibition Centre,
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Drives of the future

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Now available for the BBC Microcomputer, this superb range of high performance, low profile disc drives which give more data storage, and use less space.
The Pace range of drives include drives which are switchable between 40 and 80 tracks. As these drives are double sided they give a massive 400 k *per drive* in 80 track mode, whilst in 40 track mode they retain compatibility with Acornsoft and other commercially available software. These drives feature colour LED's to indicate operation.

All Pace drives are capable of being used as double density drives so that, as and when, a double density filing system and interface become available, the disc storage capacity will be doubled (eg. the dual 40/80 drive will have an unbelieveable 1.6m of storage).

Pace disc drives are designed to run off the BBC power supply and are supplied complete with all cables, a utilities disc and manual.

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Dealer enquiries welcome

Disc drives available:-

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PDD1	Single Sided 40 Track (200k)	£338	£388.70
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PDD3	Double Sided 40/80 Track (800k)	£579	£665.85
PDD4	Double Sided 80 Track Only (800k)	£538	£618.70
PDD5	Single Sided 40/80 Track (400k)	£449	£516.35

Available from good computer stores everywhere including:
Computer City, Widnes, Cheshire. Tel: 051-420-3333. Computerama, Stafford. Tel: 0785-41899. Silcon Centre, Edinburgh. Tel: 031-557-4546.
Computerama, Stoke on Trent. Tel: 0782-268620. G.T.M., Leeds. Tel: 0532-647474. Wilding Computer Centre, Wigan. Tel: 0942-44382
National Micro Centre, Stockport. Tel: 061-483-3605. Sir Computers, Cardiff. Tel: 0222-21341. P.J. Microsystems, Crowthorne. Tel: 0344-772351.

HOW TO GIVE YOUR BEEB A DRAG FACTOR

By PETER DAVIDSON

SOME people find even Basic programs too fast, especially people learning to play a new game or possibly disabled folk. So here is a simple program to slow them down a little.

It will work with any Basic program provided that the variable U% is not used – this can be easily changed, see later – and it will work with some machine code programs (if zero page locations &70 to &90 are not used, and the interrupt is not disabled).

Load it before your usual program. Full instructions are on the screen.

All it does is put two nested loops (with nothing inside them) into the interrupt routine, so that the computer does a few loops every 100th of a second to slow it down.

In the program the registers are pushed onto the stack, X is decremented down from 40 (this can be changed in line 120), and Y is decremented from the value in U% (values from 2 to 5 work best).

The registers are then pulled back from the stack.

If U% is used in your program, change U% in lines 10 and 50 to some other single letter integer variable, and, in line 120, change &454 – the location where U% is stored – by 4 for each letter difference.

For example, to change to T% change the location to &450 ; V%=&458 ; W%=&45C ; and so on.

Avoid A%, P%, X%, Y%. If you want to avoid variables altogether, but make the speed more difficult to change, alter line 120 to, for example, 120 LDX#40:LDY#3.

Have fun experimenting! You can see how much the machine has slowed down by typing the following (or put it in a function key):

TIME=0:FORI=1 TO 1000: NEXT: PRINT TIME

Note that as U% rises above 6 letters are missed if you do not depress them long enough as you type.

A value of U%=4 causes this simple test to take approximately twice as long as usual.

```
 10 *KEY9U%=3
    :?&204=&70
    :?&205=0|M
 20 CLS
    :PRINT '"SPEED REDUCER"
 30 PRINT '"AFTER LOADING THIS PROGRA
    M PRESS BREAK  AND LOAD YOUR
     NORMAL PROGRAM IN THE     USUAL
     WAY"
 40 PRINT '"BEFOPE RUNNING YOUR PROGR
    AM PRESS THE   RED FUNCTION KEY
     9 (TO SET THE SLOW DOWNPROGRAM
     INTO ACTION); THEN RUN YOUR
         PROGRAM IN THE USUAL WAY"
 50 PRINT '"CHANGE SPEED AT ANY TIME
     (WHILE PROGRAM IS NOT RUNNING)
     BY TYPING"'"U%=(a number from
     1 to 5)"'"AND RUNNING YOUR PROGR
    AM AGAIN"
 60 PRINT ''''"PROGRAM ASSEMBLED
     AT ";
 70 P%=&70
 80 [
 90 OPT0
100 SEI
110 PHA
    :TXA
    :PHA
    :TYA
    :PHA
    :CLC
120 LDX#40
    :LDY&454
130 .START DEX
140 BNE START
150 DEY
160 BNE START
170 PLA
    :TAY
    :PLA
    :TAX
    :PLA
180 JMP &DC93
190 ]
```

Part eight of MIKE BIBBY'S introduction to programming

Doing things wi

LET'S start off this month by reviewing the difference between string and numeric variables.

String variables label "strings" of characters, such as "HELLO" and "GOODBYE".

Numeric variables label numbers in a way that lets us do sums with them.

We can use whole words for both types of labels.

You tell the computer it's dealing with a string variable by ending the label with a $ symbol.

This means that *word$* would label a string, while *number* labels a number.

We also met another type of numeric variable, the integer variable. In this case the label is followed by a % sign. Integer variables deal with whole, or integer numbers – they haven't learnt to do decimals!

Now the computer can remember a number in the form of a string variable, in the same way as it can remember any string of characters.

This means that:

```
number$="123"
```

makes sense. Enter it now. (Remember that when we assign a string variable, the string of characters must be in quotes.)

If you now try:

```
PRINT number$
```

you will indeed get 123 appearing on the screen.

So you can, if you wish, label numbers as strings.

You cannot, though, do sums with the strings. Try:

```
PRINT 2 * number$
```

and see what happens!

The moral is, if you want to do sums stick to numeric variables.

Sometimes, however, for reasons we won't go into for a while, numbers you want to work with may be stored in string form.

Suppose we want to do sums with the 123 we stored in *number$*. We need some way to convert it into a numeric form. We do this with VAL( ) – think of it as standing for "value".

You put the string you want converting inside the brackets. Try:

```
number=VAL("123")
```

followed by:

```
PRINT 2 * number
```

This should prove to you that the string really has been converted into a number! Notice that there are two variables here, *number* and *number$*. The former is numeric, the latter string.

Of course, you can put the string variable inside the brackets rather than the full string. So you can use *number$* rather than "123". Enter:

```
number=VAL(number$)
```

then:

```
PRINT 2 * number
```

and you'll see that it works just as well.

There's also a way to convert numeric variables into strings. Again you might be wondering why anyone would bother, but for the moment, just take it on trust that one day you'll want to! We use the function STR$( ), which you can consider as standing for 'strings'. Enter:

```
number=123
```

followed by:

```
number$=STR$(number)
PRINT number$
```

and you'll see how it works.

Now when I said that you can't do sums with strings I was being completely truthful. However there is something you can do with strings that looks suspiciously like you're doing sums.

Enter:

```
string$="*"+"@"
PRINT string$
```

What happens is that the '+' sign 'glues' the two strings together. The jargon calls this "concatenating strings". The add sign in this case doesn't mean addition. Try:

```
string$="123"+"123"
PRINT string$
```

and you'll see what I mean.

Sometimes it's useful for us to know how long a string is – after all, the computer sometimes receives strings via an INPUT statement and you won't know its length.

We use the function LEN( ), short for length. Try the following:

```
string$="ABCDEF"
PRINT LEN(string$)
```

Also try the above with a couple of spaces between the first quotes and the A – spaces count!

Have a look at Program I.

```
   10 REM *** PROGRAM I ***
   20 MODE 6
   30 first$="ABC"+" "+"DEF"
   40 second$="ABC"+""+"DEF"
   50 PRINT ''''"first$ is "first$
   60 PRINT "Its length is ";
LEN(first$)
   70 PRINT "second$ is "second$
   80 PRINT "Its length is ";
LEN(second$)
```

Program I

Look carefully at lines 30 and 40. The strings *first$* and *second$* are not identical. In line 30 the second pair of quotes encloses a space. In line 40, the second pair of quotes enclose absolutely nothing – not even a space.

We say that they enclose the "null string" – that is, absolutely nothing.

This results in there being a space between the ABC and DEF in *first$*, but there being absolutely nothing between the two sets of characters in *second$*.

It also explains the different lengths.

Have a look at Program II. Notice, by the way, that lines 50 to 100 contain a lot of repetitions – judicious use of the copy key will save you a lot of typing!

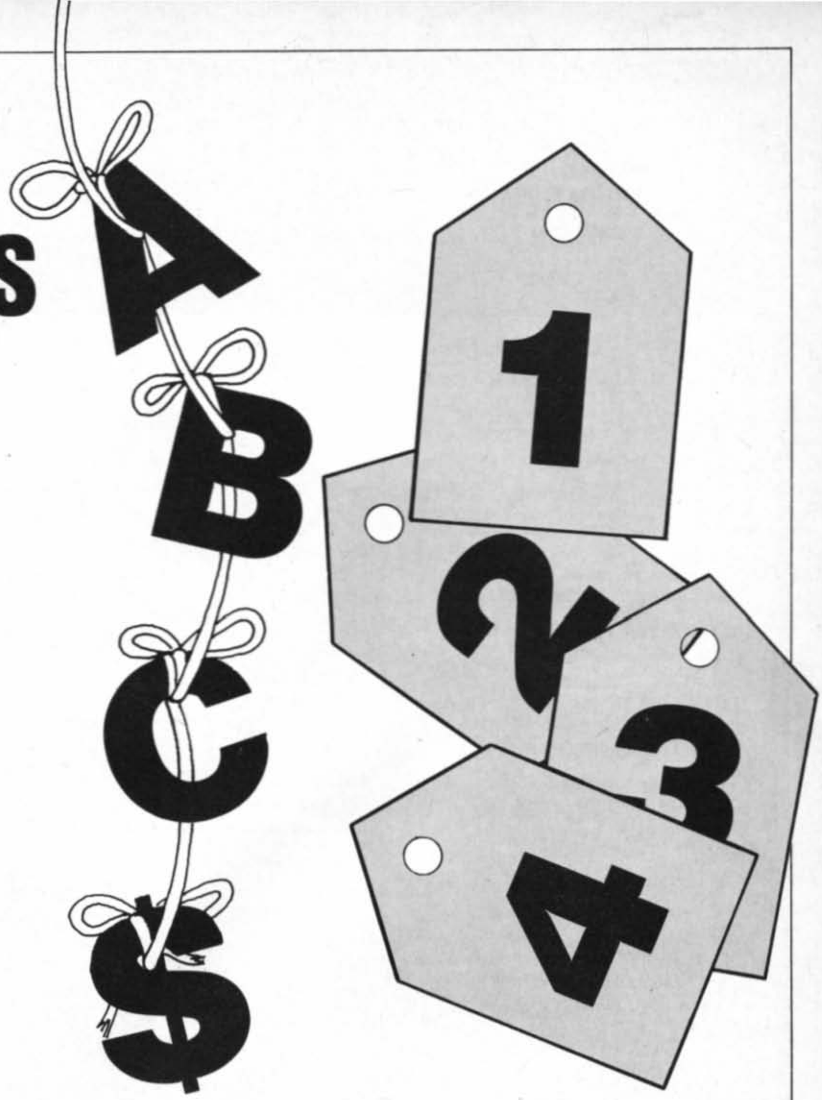
```
 10 REM *** PROGRAM II ***
 20 MODE 6
 30 string$="*"
 40 PRINT '''string$
 50 string$=string$+"*"
 60 PRINT string$
 70 string$=string$+"*"
 80 PRINT string$
 90 string$=string$+"*"
100 PRINT string$
```

Program II

Line 30 sets *string$* to one asterisk and prints it in line 40.

Line 50 then adds an asterisk onto the end of *string$*, making it two asterisks

th strings



long. It is then printed in line 60.

Line 70 similarly glues an asterisk on the end, line 80 then prints the whole string, and so on.

In describing the above program there was a "dead giveaway": I said that it contained "a lot of repetitions". If that's so, why didn't I use a loop? I rectify this in program III.

```
  10 REM *** PROGRAM III ***
  20 MODE 6
  30 INPUT '''"How many times", numbe
r%
  40 FOR loop%=1 TO number%
  50 string$=string$+"*"
  60 PRINT string$
  70 NEXT loop%
```

Program III

This is the first time we've actually INPUT the loop parameter, in this case *number%*. This means that we leave specifying how many times we perform the loop until the program is actually running!

Line 50 contains the heart of the program. Each time through the loop it increases *string$* by one asterisk then prints it out. The result's a neat looking triangle of asterisks!

Try entering low values for *number%* at first. What happens if you enter 0?

Now that we understand the LEN( ) function, we can achieve the same results as Program III with a REPEAT... UNTIL loop. Look at Program IV.

```
    10 REM ** PROGRAM IV ***
    20 MODE 6
    30 INPUT '''"How many
  time$",number%
    40 REPEAT
    50 string$=string$+"*"
    60 PRINT string$
    70 UNTIL LEN(string$)=number%
```

Program IV

Here we simply repeat until the length of *string$* has reached *number%* (The length of *string$* increases by one each time through the loop so we can use it to keep track of how many times we've "looped".)

Try Program V.

```
  10 REM *** PROGRAM V ***
  20 MODE 0
  30 offset%=64
  40 FOR loop%=1 TO 26
  50 string$ = string$ + CHR$(offset%
+ loop%)
  60 PRINT string$
  70 NEXT loop%
```

Program V

This uses the same idea as Programs III and IV. Line 50 simply increases the string by one character each time through the loop. The character is determined by the CHR$( ) function. The first time through the loop it's 'A', the second time a 'B' is glued onto the end of the 'A' and so on until we eventually have the whole alphabet.

Notice that line 20 puts the micro into Mode 0. This is so we can fit it all on the screen! You might want to return your micro to normal after the program with a MODE 6.

See if you can predict what happens if you changed line 50 to:

```
  50 string$ = CHR$(offset% + loop%) +
string$
```

Finally, can you alter program V so that it still prints out its "alphabetic triangle", but with the alphabet reversed? That is, so that it goes:

```
Z
ZY
ZYX
ZYXW
....?
```

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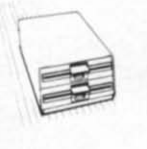

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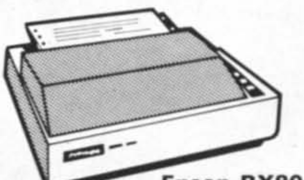

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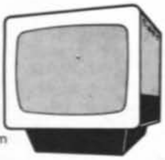

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LONGMAN SOFTWARE

Chess for three gives the White Knight a winning gambit

By ALEX BELL

ALEX BELL is the author of "Games Playing with Computers" and "The Machine Plays Chess?" Here he explains how you can test a chess program with some of the methods he has used over the last 20 years.

DID you know that there are 14,772,512 ways of placing 16 queens on a 16 by 16 chess board so that no queen attacks any other? Or that you can mate a black king on an infinite board with a white king, rook, bishop and knight?

Or that you can be a rotten chess player (like me) and still test and evaluate chess programs better than Bobby Fischer?

I was asked to comment on three BBC chess programs – *Acornsoft* Chess (£9.95), *BBC Soft* White Knight (£9.95) and *Computer Concepts* Chess (£8.95).

If you already have a chess program that allows you to set up positions then you can compare it with these (and other) programs using the following standard tests.

TEST 1: MATE TIMER

Ask the program to find two and three move mates from the opening position. The results were (in seconds):

	2 move	3 move
BBC Soft	<1	7
Acornsoft	9	257
Concepts	36	>600

BBC Soft was by far the fastest to report that there is no solution. Computer Concepts does not have a specific "mate in N" mode and has to be set to look at all moves at all levels down to three and five ply (a ply is a move by black or white). It chose P-K4 for a full three ply search and I got tired of waiting for the five ply response.

Acornsoft was intermediate but later testing showed that it does consider underpromotion which BBC Soft does not.

Testing the programs with genuine two move mate problems gave an average of about two seconds for BBC Soft, 50 seconds for Acornsoft and interminable for Concepts.

I was impressed by BBC Soft's speed and compared its performance using a problem that I have run on many other computers. The oldest machine was an ICL Atlas (circa 1963 and costing £3 million) with a program written in machine code which took four seconds – twice as long as a £10 program on a £400 micro. But the cycle times of the two machines are comparable – each could/can add about half a million numbers a second.

TEST 2: OPENING TRAPS

I always play black because there is more opportunity to lay traps and none of the programs have a book to protect them from errors. All tests gave the programs about one minute on average to play their moves. The first game was against the Acornsoft which, without any forcing, played:

1. P-K4 P-K4
2. N-KB3 N-QB3
3. B-B4

A Giuoco Piano and black has some nice traps, for example the Blackburne shilling game where you offer up a pawn with 3. N-Q5 – I have never seen a program refuse this one unless protected by a book so (See Photo II):

4. N×P Q-N4

Dumb programs play N×P forking the queen and rook but Q×NP threatens mate in one and white is in deep trouble. Acornsoft played:

5. B×P+ K-K2
6. B×N Q×NP
7. N-B6+ KP×N
8. R-B1 Q×KP+
9. Q-K2 Q×Q++

Move seven is the classic "horizon effect" – anything to put off the evil check and checkmate. The best line at move six is to castle (and lose the knight – BQ×N) followed by P-KB4.

To test BBC Soft I forced the first three moves and it played:

4. N×P Q-N4

as expected. However one of the nice features of BBC Soft is that it displays the "Best line" – what it thinks is its best move and what the opponent will probably reply down to four or five ply. It clearly saw that Q×NP was going to be trouble but it played the same line as Acornsoft:

5. B×P+ K-K2
6. B×N Q×NP
7. P-Q3 K×R+

An unusual move to sacrifice the rook but it does give the black king a bolt hole.

8. K-Q2 Q×Q
9. K×Q R×B

and it's still playing, whereas Computer Concepts was just dumb:

5. N×BP Q×NP
6. R-B1 Q×KP+
7. B-K2 N-B3++

Another trap which can be tried from

From Page 39

white opening Giuoco Piano is the Wilkes-Barre line, thus:

1. P-K4 P-K4
2. N-KB3 N-QB3
3. B-B4 N-B3

which invites white to attack the weak KBP with N-N5. In fact, none of the programs would play this move (although it is all right if you know what you are doing) so I forced it on all of them. Concepts played:

4. N-N5 B-B4
5. N×BP B×P+
6. K×B N×P+
7. K-B3? Q-B3+
8. K×N P-Q4+
9. B×P Q-B5+
10. K-Q3 Q-Q5+
11. K-K2 B-N5+
12. K-K1 B×Q

BBC Soft also played 5. N×BP inevitable from move six when the king moved out towards the middle of the board.

White Knight also played 5. N×BP but the B×P+ made it think for over five minutes. It can do this because it only has to average one minute for each move (whereas Concepts sticks rigidly to its time for each move).

The "Best line" showed that it considered K-B1 for over half of the five minutes because the knight check is difficult to analyse. However greed overcame caution:

6. K×B N×P+
7. K-K3 Q-B3

This is better than Concepts but still greedy – if white retires the king it cannot have the black rook because of Q-B3, which either checks or threatens mate in one. But the best line is K-N1 because of the skewer or the following:

8. N×R Q-N4+
9. K×N P-Q4+
10. K×P N-N5+
11. K-B5 Q-K2+
12. K-N5 B-Q2+
13. K-R5 Q-B4++

Acornsoft was the only program to avoid the trap with the right move:

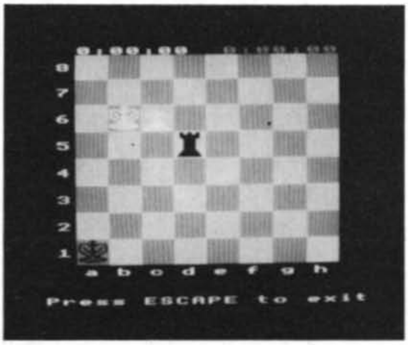
6. K-N1 Q-K2
7. N×R

and black has a poor game.

TEST 3: END GAME PROBLEMS

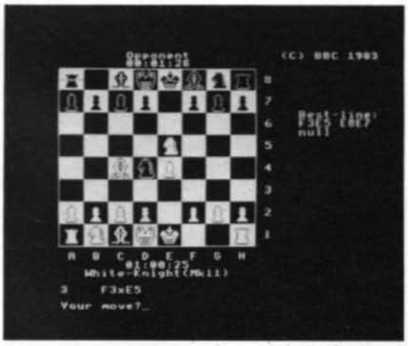
Comparison of end game abilities is difficult because the time settings on the programs differ. Concepts always sticks rigidly to its one minute for each move whereas Acornsoft has playing levels which have to be set higher for an end game to play at the test speed.

BBC Soft only averages its moves to one a minute giving it a definite advantage in difficult positions.



```
Press ESCAPE to exit
```

Photo I: Acornsoft Chess

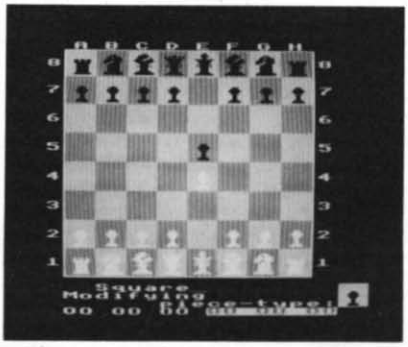


```
Opponent                (C) BBC 1983
00:01:28

                          Best line:
                          F3E5 C6E7
                          null

     01:00:25
  White-Knight(Mk11)
3    F3xE5
Your move?_
```

Photo II: BBC Soft White Knight



```
    Square
Modifying
           Piece-type:
00  00  00
```

Photo III: Computer Concepts Chess

All the programs appeared capable of performing the king, queen versus king ending (Acornsoft needs level six or seven for this and announces its move with a chime) but the king, rook versus king ending was too difficult for all of them.

They all tend to move the king to the centre of the board but then have no idea what to do with it.

An interesting question is how do these micro-programs compare with the tournament programs running on large mainframe computers?

Consider the position in Photo I, a famous problem which has baffled many people since the turn of the century and a good test of a program's appreciation of repetition of position.

Mainframe programs circa 1975 were just reaching the point where they could solve such problems because they could be set to a "play and win" mode, appreciating that repetition is a draw and underpromoting the pawns.

This is the way it worked. The pawn is given a value equal to a queen – a fiddle but nevertheless equivalent to what a human expert does when asked to solve the problem.

The only move that can keep this

valuable pawn is P-B7 so the program should play it without any further investigation of the consequences.

To misquote Sherlock Holmes: "When all possibilities except one are eliminated then the exception must be the answer".

Black must now check the white king, and white, in order to avoid draw by repetition and avoid losing the pawn with a skewer, must move steadily down the knight file until it can play K-QB2 which prevents the skewer threat.

Black might then play R-Q5 which threatens stalemate (if white queens the pawn then R-QB5+) but tournament programs in 1975 could search 11-ply ahead and see that the underpromotion to a rook is a win for white.

None of the micro-programs (playing black or white) had any idea of how to play this ending although BBC Soft does have a crude appreciation of repetition of position and Acornsoft can underpromote.

I give this example in order to justify my opinion that these programs' playing abilities are roughly equivalent to the state of the art about 10 years ago on the most powerful and expensive computers.

They are incredibly cheap in comparison and the modern micro is about 10 per cent of the speed of the giants of 10 years ago.

But they are obviously still limited, mainly by their store size (hence the lack of book openings and knowledge of how to play end games).

The store size will increase on the BBC Micro when the Tube arrives. This means that the display handling (which occupies about 10k in BBC Soft – about one third of the machine) can be done by the second processor and the programs should then improve their openings and end games dramatically.

However, it is invidious to compare the modern micro with its giant ancestors on purely chess playing ability.

The micro, with its interactive features and display monitor, can and does support vastly superior display and manipulation features over the old programs.

Ease of setting up positions and selecting options are important factors in designing micro chess programs and the display of information is also very important.

For example, BBC Soft display of the "Best line" is an inspiration by its author, 23-year-old Martin Bryant, and a feature that will become a must for future chess programs.

To actually see what the program is thinking about while you wait for its move is quite fascinating, particularly when testing it with traps.

Another nice feature of BBC Soft is the simple setting of its playing speed to an average time for each move. When in trouble the program reacts in an intelligent fashion by taking longer to make its reply.

CONCLUSIONS

Concepts compared poorly with the other programs in almost every test and option. In terms of playing strength Acornsoft and BBC Soft are about equal, with Acornsoft rather easier to manipulate and with rather more options. It (and Concepts) allows you to save and reload a position with a filing system, an option BBC Soft's does not provide.

Nevertheless BBC Soft's "Best line" together with its very fast problem solving mode must give it the edge in terms of entertainment and value for money.

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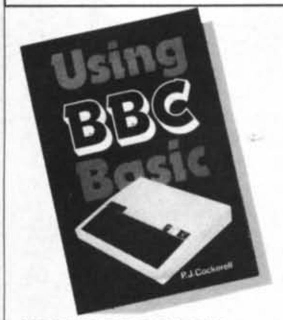

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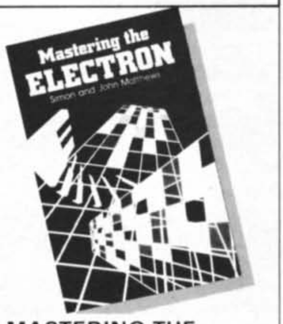

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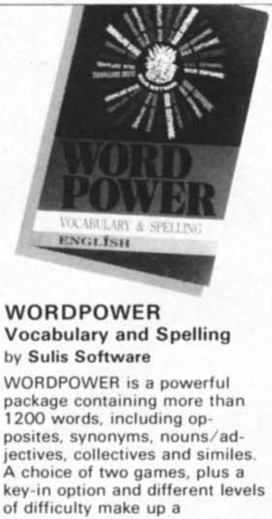

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Meet the pixels on your Christmas tree

By MICHAEL NOELS

THIS MONTH we are going to use the graphic methods we've already discussed, plus some new ones, to produce a seasonal offering – a Christmas tree with an appropriate greeting.

The finished product is Program VII. Before that, though, we'd better look at a few of the techniques it uses, the most important of which concern user defined characters.

These characters, as their name implies, allow you to use the PRINT statement (or VDU) to print out your own special characters on the screen.

In the BBC Micro's graphics modes, all the characters are drawn on an 8 × 8 grid, each cell of the grid being known as a pixel.

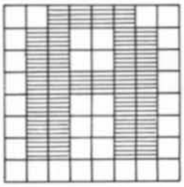

Figure I. Pixel pattern for the letter A

Figure I illustrates how the grid for the letter A is filled out. To print this letter by using its Ascii code simply enter:

```
PRINT CHR$(65)
```

Now the BBC Micro has several blank grids ready for you to fill. These grids have the Ascii codes 224 to 255.

Once you've filled, say, 224 with the required pattern of cells, to print out this user defined character, you type:

```
PRINT CHR$(224)
```

and it appears where the cursor is, with the appropriate foreground and background colours.

Figure I illustrates how you can define your own character. You simply fill in the cells of the 8 × 8 grid until you get the pattern required. Then all that's needed is a few simple sums.

Each column of the grid has a value. The value of the rightmost column is 1, the one to its left 2, the one to the left of that 4, and so on, doubling each time until the leftmost column has a value of 128.

You may have noticed that these are the column values of a binary number.

Each row of the grid has a number calculated for it and you add together the column values of each cell shaded in that row.

Figure II shows the idea. Each row has its number. To teach the computer this pattern we use:

```
VDU 23
```

```
   10 REM *** PROGRAM I ***
   20 MODE 4
   30 VDU 23,224,153,66,36,153,153,36,
66,153
   40 FOR I%=0 TO 19
   50 PRINT TAB(I%,I%)CHR$(224)
   60 NEXT I%
```

followed by the Ascii code we're going to use for it followed by the eight numbers we've calculated for the rows, starting with the top and working down. All these are separated by commas.

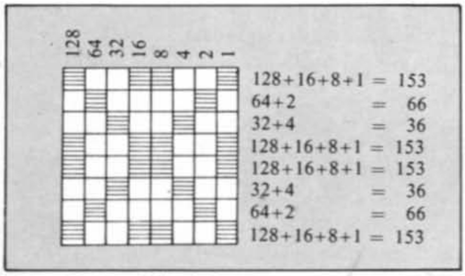

Figure II. User defined characters

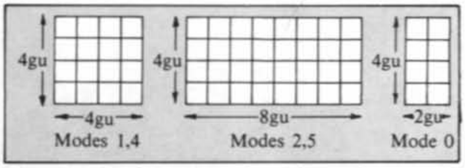

Figure III. Pixel sizes in each graphic mode

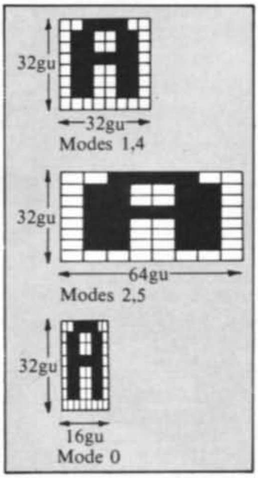

Figure IV. Character sizes in each graphic mode

So, to define character 224 to be the pattern shown in Figure II, we use:

```
VDU 23,224,153,66,36,153,153,36,66,153
```

Program I makes use of this character. Try altering line 20 to:

```
20 MODE 5
```

and notice the difference – the character is spread sideways. This is because the shape of the pixels in Mode 5 differs from that in Mode 4.

A pixel is the smallest point you can plot on a screen. Its size limits the resolution, or fineness, available.

As Figure III shows, in Modes 1 and 4, the pixel is four graphic units (gu) square, whereas in Modes 2, 5 and 0 it is variously oblong.

So when you print out an 8 × 8 pixel grid in Mode 4 it comes out square, whereas in Mode 5 the wider pixels stretch the figure. Figure IV shows the size of a character in each graphic mode in terms of graphical units.

You have to allow for this alteration in width when you are visualising your user defined character. I find it easier to see the character I want in terms of square pixels, so I've stuck to Mode 1 in Program VII even though it limits the range of available colours.

Let's try to print a pattern with our user defined character. We'll simply print the character three times, in a vertical line.

We can use the cursor control codes to ensure that the characters actually end up vertically aligned.

VDU 8 moves the cursor left
VDU 9 moves the cursor right
VDU 10 moves the cursor down
VDU 11 moves the cursor up

→

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Program II illustrates the technique.

Remember that we can string VDU statements together. Line 40 works like this: 224 prints the character, leaving the cursor directly to its right. 8 moves the cursor back left and 10 moves the cursor vertically down, leaving it directly under the first character. 224 prints the character again. 8 moves the cursor left and 10 moves the cursor down so that 224 prints the character vertically under the other two.

We can also use:

```
PRINT CHR$(8)
```

to move the cursor left, and so on for the other cursor movements. Although slightly longer, this has the advantage that we can add all the characters, user defined and cursor movement, into one string and then simply print out that string.

This results in the combined characters appearing far more quickly than with the VDU method. (See Program III.)

We use this technique in Program VII. Lines 210 to 290 each add together the user defined characters required to make the various shapes. Line 210, for example, defines a candle.

Notice how I use the name *candle$* for the combined character string – it's far more meaningful than, say, *shape1$*.

```
   10 REM ### PROGRAM II ###
   20 MODE 4
   30 VDU 23,224,153,66,36,153,153,36,
66,153
   40 VDU 224,8,10,224,8,10,224
```

```
   10 REM ### PROGRAM III ###
   20 MODE 4
   30 VDU 23,224,153,66,36,153,153,36,
66,153
   40 character$=CHR$(224)+CHR$(8)+CHR
$(10)+CHR$(224)+CHR$(8)+CHR$(10)+CHR$(
224)
   50 PRINT character$
```

In Program VII, the actual user defined characters are defined in lines 170 to 210, which read in the values for each VDU 23 from the DATA statements in lines 930 to 1060, 'VDUing' each parameter at a time (line 190).

Notice how –1 is used in line 1060's DATA statement to mark the end of the parameters.

When we print a user defined character, it prints, as we have seen, in the currently defined foreground and background colour.

Suppose, however, that we want a two-colour foreground, such that the centre pixels of our previous character and those in the middle of the outer edges are yellow, while the other pixels are red. (We'll leave the background black.)

You might think that we could do this by defining our character (224) as before and printing it in red, then overprinting it in yellow with another user defined character (225) containing only the pixels we want to be yellow. The red pixels should then show through.

Figure V illustrates the idea. However, it isn't as straightforward as this, as Program IV shows.

What happens is that the second character's background is printed, as well as its foreground, completely overwriting the first character!

We need some way of writing just the foreground of the characters – making the background transparent.

We can do this by using the command VDU 5. After such a command, the micro only prints the foreground of characters. This works not only for user defined characters, but for the whole character set as well.

There is one snag, though. VDU 5 also causes the characters to be printed not at the text cursor, but where the graphics cursor is.

Technically, we say that VDU 5 joins the text and graphics cursors. However, it's the graphics commands that are used to position the joined cursors – and to set colours – so I consider that VDU 5 causes characters to be printed at the graphics cursor.

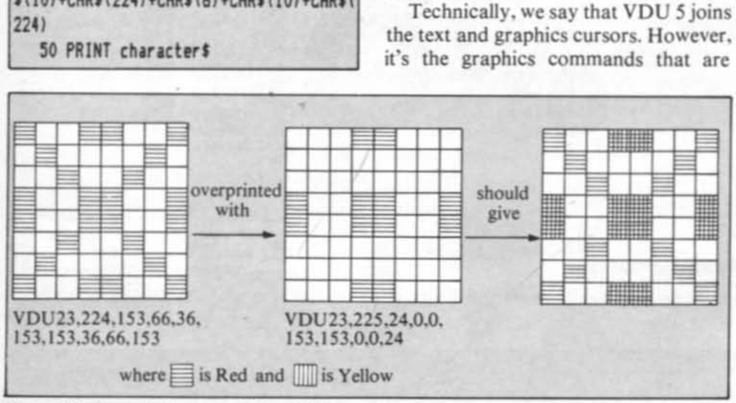

Figure V. Overprinting user defined characters

```
   10 REM ### PROGRAM IV ###
   20 MODE 1
   30 VDU 23,224,153,66,36,153,153,36,
66,153
   40 VDU 23,225,24,0,0,153,153,0,0,24
   50 COLOUR 1
   60 PRINT TAB(19,15)CHR$(224)
   70 COLOUR 2
   80 PRINT TAB(19,15)CHR$(225)
```

```
   10 REM ### PROGRAM V ###
   20 MODE 1
   30 VDU 5
   40 VDU 23,224,153,66,36,153,153,36,
66,153
   50 VDU 23,225,24,0,0,153,153,0,0,24
   60 GCOL0,1
   70 MOVE 640,512:PRINT CHR$(224)
   80 GCOL0,2
   90 MOVE 640,512:PRINT CHR$(225)
  100 VDU 4
```

This means that, after a VDU 5, to print a character at a certain location on the screen you have to place the graphics cursor there with the MOVE statement before PRINTing.

The numbers involved might take a bit more thought, but you gain two advantages. Firstly, you can position your character to the resolution of the screen, that is, within one pixel. With the TAB statement, you are limited to the eight pixel resolution of the character grid.

Secondly, of course, you only print the foreground of the character – there's no background to overwrite things.

Another useful aspect of operations after VDU 5 is that the cursor movement characters still work. For example, CHR$(8) still moves the graphics/text cursor one whole character (eight pixels) left from its previous position. Try Program V.

Notice the use of VDU 4 at the end – this turns off the VDU 5. You should always tidy up this way – leaving VDU 5 in operation can cause problems. Try listing a long program with VDU 5 on to see what I mean.

Also, the relevant colours are the graphics colours, not the text colours, so we use GCOL0 instead of COLOUR.

A word of warning. Don't use TAB with VDU 5 on. Although you can get away with it in OS 0.1, your program won't work when you upgrade to later systems.

Now run Program VI. This has the

→

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COMPUTING NEWS

DECEMBER 1983

ISSUE 2

A NETWORKING MARRIAGE FOR THE BBC MICRO FROM GSL AND AMCOM

Rod Lewis(left), GSL's Sales Manager, discussing E-NET's speed, simplicity and versatility with a customer.

AMCOM'S E-NET is a flexible network filing system for the BBC microcomputer, specially designed in conjunction with GSL for Education use. It uses the network interface in the BBC machine so that if you already have networked machines it only requires fitting a new ROM in each clients machine and installing the Hard Disc Unit. (If you do not have network B's then a network interface has to be fitted to each machine).

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E-NET has many useful extra commands. For example a simple command which only operates from the master (teacher's) machine, and which forces each client machine (in a certain specified room or area) to load and run a particular program is included. This is very fast, and flexible, and allows for efficient use of C.A.L. packages. Care has been taken to ensure that the command structure is simple enough not to intimidate the non-specialist, while remaining flexible and robust.

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From Page 45

same effect as Program V. In this case we define a string to print out our multi coloured character (line 50). The latter might need some explanation.

Instead of using GCOL0, 1 we can:

`PRINT CHR$(18) + CHR$(0) + CHR$(1)`

where CHR$(18) is in place of GCOL
CHR$(0) is in place of 0
and CHR$(1) is in place of 1

So, the first four CHR$ statements of line 60 give the foreground colour 1 (red), followed by the user defined character (224). The next three CHR$ statements change the graphics colour to logical colour 2 (yellow), then CHR$(8) performs a backspace, ensuring that CHR$(225) overprints the first character.

```
   10 REM *** PROGRAM VI ***
   20 MODE 1
   30 VDU 5
   40 VDU 23,224,153,66,36,153,153,36,
66,153
   50 VDU 23,225,24,0,0,153,153,0,0,24
   60 character$=CHR$(18)+CHR$(0)+CHR$
(1)+CHR$(224)+CHR$(18)+CHR$(0)+CHR$(2)
+CHR$(8)+CHR$(225)
   70 MOVE 640,512
   80 PRINT character$
   90 VDU 4
  100 VDU 4
```

We use this technique in Program VII to obtain our fairy. Line 270 adds together the string *fairy$*, consisting of its body. This is printed over *wfairy$* which is the fairy's body plus wings (PROCfairy, 710-780).

fairy$* and *wfairy$ each consist of nine user defined characters, in a 3 × 3 grid. Actually, two of the characters of *fairy$* (235 and 237) are completely blank. Since one variable overprints the other, I decided to keep the grid standard for easier handling.

Similarly, we print a filled-in ball, *fball$*, followed by its outer rim, *uball$*, on top of it (PROCballs, 590-690).

The candles are printed out as a combined string *(candle$)* in PROCcandles (490-570).

The actual tree shape is drawn by printing three green triangles, the apexes of which overlap (PROCtriangles, 320-390). The base of the tree is drawn in PROCbase (410-470).

PROCmessage simply prints out a seasonal greeting, using VDU 5 to give a sort of 3D effect. Program VIII illustrates the technique.

What it does is to print out 'A WORD' in yellow several times, each time moving it down four graphic units to the left and down (line 60). This is because, each time through the loop, the number we reduce the X and Y coordinates by, I%, is increased by 4.

The reason we move four graphic units at a time is because this is the minimum resolution in Mode 1.

When you exit a loop, the loop variable is still incremented before the check to see if the loop should be terminated is made. So, when line 90 is reached, I% is four greater than when the loop last printed 'A WORD'. Also the colour has changed to red (line 100) so line 110 prints out 'A WORD' in red, one pixel down and to the left of the last 'A WORD'.

Try to decipher Program VII – working through other people's programs is one of the best ways to improve your own programming.

Next month, after this seasonal diversion, we'll return to the graphics straight and narrow with the GCOL statements I promised!

Full listing on Page 107

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Physiological Simulation
Five Ways Software

WHATEVER activity we are involved in, be it sitting and reading *The Micro User* or competing in a quadrathon, our brains make sure that the body processes are maintained between fine limits.

This system of feedback, or homeostasis, involving the body organs and the brain is essential to life. At last there is a software package designed to demonstrate this vital physiology in a form intelligible to all biology students.

Physiological Simulation is an MEP subsidised biology package published by Heinemann Computers in Education. It is designed for use with pupils aged 13 and above.

The program's greatest asset is that it allows physiological investigations to occur which would not normally be within the scope of school laboratory facilities. It also allows the effect of a simple variable to be assessed in a complex physiological system.

Put simply, the user (playing the part of the brain) has to keep the body, (played by the computer) alive while performing one of a dynamic range of activities, such as running, sleeping, walking, hockey, rock-climbing and rowing.

The user begins by opting to use preset values or to input pupil details (sex, age, mass, blood volume and vital capacity), activities (already mentioned) and parameter values (breath, volume, rate of breathing and sweating rate).

Do not let the idea of measuring pupil blood volumes put you off. The detailed booklet provided has a simple-to-use nomogram which enables this variable to be quickly calculated from the subject's height and mass. Vital capacity is easily measured in class using the normal spirometer apparatus.

Once these data have been provided dynamic graphs show the person's progress over a simulated 50 minute period. A colour monitor is an advantage as the background colour changes from red to blue, while the display remains white.

Apart from a clock showing the time elapsed, graphs of oxygen debt, sugar used, oxygen supply, body temperature and water loss are all provided. A word of warning: the interpretation of the oxygen debt graph needs clear explanation before the simulation otherwise it is very misleading.

The user must maintain all five of these variables within displayed upper and lower limits or the activity ceases and a message indicates the reason for failure, for example "Person is DEAD"!

The secret of success is to freeze the action when the body is in danger and change either the parameters or activity. Unfortunately the axes of the graphs do not show any scale or units. This facility would make the graphical display more intelligible and bring the software up to A-Level requirements.

Once the simulation has finished it is possible to begin the program again, terminate it or display further options such as beginning a comparative simulation for a second person. After such a comparison the user can replace any one of the two sets of data and try another comparison.

The program is well "student-proofed". It is very difficult to make an error which throws the program haywire.

Clearly such a package is of most use in a teacher demonstration situation – maybe using more than one monitor if the group is large – or possibly by the more able pupil in small well-supervised groups.

Hard copy is not provided for users. This is a pity as a printout would provide a permanent study/revision piece.

A program is only as good as the mathematical model it is based on. The medical data used was mainly derived from a Swiss sample taken in 1956-57.

One cannot help but wonder how different the pupils are today when compared with those used for the present values, but the program's saving grace is that it does allow fresh data to be inserted. The source of the calculations used to plot the graphs is not disclosed – a glaring omission.

The notes for teachers are well documented on the whole and particularly useful for teachers using computer-aided learning material for the first time. It is unfortunate that no bibliography is provided to aid teachers in background/further reading.

Visual presentation in this software package is top class. The program is fun to use, but be prepared to spend an hour or two in preparation time to master its principles first. It is not an instant lesson, nor is it designed to be one, but it is a flexible and powerful educational tool which should be in every biology teacher's "toolbox".

At £12.50 – for disc or tape – this package is good value for money and recommended for use by all secondary school biologists.

Peter Hillman

Pardon my French...

Essential French Verbs for the BBC Micro (32k)
Carsondale Enterprises

THIS program covers 83 French verbs, in three main groups according to difficulty.

The choice of verbs is, of course, largely a matter of taste but I could have thought that *absoudre, accroitre, croitre, assaillir, dechoir* could have been omitted and replaced with many of the common *être* verbs: *sortir, entrer, monter, retourner, revenir, devenir,* which are missing and which are essential Form Five verbs.

The second option allows one to look up the verbal forms by verb. The third option allows the user to look up by tense. The tenses covered are the present, imperfect, perfect, future and conditional – the five essential tenses.

The screen is divided into two halves. The bottom explains what is happening and the top displays the conjugation of the verbs in two "windows". Four colours are used but black and white can be specified. This makes them somewhat easier to see.

I had looked forward to seeing the perfect tense but I was somewhat disappointed. Not only were many *etre* verbs missing but also the whole range of possible past participle endings were not displayed, nor were the *elle* and *elles* form (though there is a spare line in the window).

As the conjugation of the singular is displayed side by side with the plural, there is no room to show the *nous, vous* and *ils* form of reflexive verbs (except for *se taire)* and so the effect is lost. Again the participle agreements are simplified.

Could not these forms have been shown in the other window? The forms are obviously in memory because they are tested later.

The "browse" option allows the computer to display verbal forms quickly or slowly of the group of verbs and tenses chosen. The quick option displays a conjugation about once a second which is a little fast.

The fifth option is "test". Once again, one may chose any group(s) of verbs and any of the tenses specifying a time limit if desired. The computer is very strict and does not allow extra spaces to be typed in inadvertently. Perhaps a procedure could have been used to allow this.

It is perhaps the "retest" option which is the most novel in this program. The first 10 elements of a test may be stored in memory or recalled from cassette or disc for retest, either the whole test or just the mistakes. This seems potentially useful to the learner and a 10 element test will not lose his interest.

To sum up, a sound program and a good "verb calculator" and data base. It could however, have been more explicit in the perfect tense which is a major stumbling block for the "O" Level candidate.

...and German too!

German Sentence Practice for the 32k BBC Micro
Educated Owl Software

THIS software cassette contains two programs. The first illustrates and gives the text of nine sentences or phrases and requires the learner to reproduce the sentences exactly.

The program causes the sentence to be shown on screen and requires him to reproduce the whole sentence. Praise is given when the sentence is correct. No score is kept.

The above bald description might indicate at first sight an expensive way of getting children to learn a few sentences, but this does not take into account the fact that the graphics, though simple, are extremely motivating and totally relevant to the sentences.

Many are animated, including a little man who enters a bank, and a little man who gets into a car. Four colours are used and the drawings are created on screen out of basic shapes – rectangle, triangle, circle – and this reveals the second level of the programming.

The manufacturers supply details for changing the text and for changing the graphics. The program is, in itself, a rich source of graphics procedures and means of tying text with pictures, and could prove of interest to the language teacher interested in programming or a colleague who could help him.

It is this possibility of extension that makes the program useful. Here, for reference, is a translation of the nine phrases used. I give this because a "French Sentence Practice" cassette is also available, which would appear to have the same graphics.

The sentences are: 1, I'm shopping; 2, The handbag; 3, He has spent money; 4, He gets into the car; 5, He has to wait 30 minutes; 6, The big man who wanted to be small; 7, I ask for money; 8, Twenty marks (100 Fr in the French version); 9, He has gone into the bank.

The sentences come from the same shopping/town situation but have mixed tenses and persons – I suppose they represent important constructions, but the reason for the selection is not immediately clear though the same phrases occur in the second program.

The second program is a cloze type program. The learner is presented with a 150 word narrative about Mrs Gieselmann shopping (good "O" Level and CSE material) in the imperfect tense with 20 blank spaces to fill in. The learner is helped by being given the next letter if he fails to guess it after three attempts. A percentage score is given at the end.

Again, this program is on two levels – the text given and the fact that instructions are given on how to change the text and decide which words are to be blanked out. This tape can thus be considered a general purpose cloze-type program. In short, two programs with potential – motivating and with good use of graphics.

These reviews first appeared in the November 1983 issue of Language Monthly, and are reproduced by courtesy of Praetorius Ltd, 30 Clarendon Street, Nottingham NG1 5HQ.

Making sweet music

Music Editor *System Software*

THE only criticism I have of System Software's Music Editor is its name. It should be called the Music Maker because that is exactly what it is – an easily-used utility which allows you to compose tunes on your BBC Micro.

You write the tunes using two modes of operation. The first is edit mode in which the actual composing is done. The skeleton of a piece of sheet music (technically known as the bass and treble staves) appears on the screen and you can use the keyboard to enter in a tune, note by note.

When you enter a note it not only sounds but also appears on the staves in the right position with the right value. If it's not what you want then you can just press a key to delete it and try another.

It's not just the pitch of the note you can alter. The program allows you to alter the duration and loudness of the notes, simply and quickly. You can even choose the key and tempo of your tune.

And if that's not enough you can have up to three parts or "voices" to add harmony to your composition. It may sound complicated but in practice it isn't – the software sees to that.

The second mode is the command mode and by using this you can "command" the micro to play back your masterpiece. You can have the whole tune or just a part of it and the program even allows repeats of sections of the piece. If you like what you hear you can save it for posterity. If you don't it's back to editing mode and the throws of creation! And if you need inspiration you can always load one of your previous efforts and play it.

As if all this weren't enough, when you first run the Music Editor you get a choice of 16 ready-to-use sound envelopes. If you don't like these you can alter them easily from the keyboard or load envelopes that you have previously altered and saved.

These are just the major facilities that the program gives you. There are lots more, all useful. And if you get lost you can always press the H key and get a crib sheet.

But you shouldn't need it. The instruction booklet is excellent and the whole program an example of what is meant by "user-friendly". People with no musical knowledge may be a little daunted at first but the Music Editor is so easy to use that it encourages experiment and with it learning.

You can write tunes by ear while the display gives you the correct musical notation. It's a gift to every frustrated composer, thwarted music teacher and parent who wants to give a child something that is amusing yet educational. And it's so much fun to use!

This excellent piece of software was a pleasure to review. Thoroughly recommended.

Nigel Peters

Physically, it's a bit of a weakling

Physics *Program Power*

ON loading this attractively illustrated program my first impression was one of disappointment.

As it comes from one of the more promising software producers, I had hoped for a lively and imaginative guide to physics formulae and effects.

But if you're looking for attractive graphics or even some vague degree of user-friendliness, this program offers little satisfaction.

If, however, you want a plain and simple testing-of-formulae program, Physics will probably suit you.

The program is menu driven, and offers eight options: Test, List, Formulae, Instructions, Load Data, Save Data, Add Data, and End.

With the Test option, you are given 10 questions such as:

The power is 4.3W
The current is 6.9A
What is the voltage?
Units?

You have to enter the answer and the correct abbreviation for the units. If you get the answer wrong, then in the above example, the response is "Wrong, 4.3/6.9 = 0.623188406. The units of voltage are V".

Your score at each stage is displayed, and after the 10 questions it is also given as a percentage.

The full list of quantities and units is given by the List option, and consists of 28 quantities beginning with mass, density, volume and ending with resistivity, length, temperature, sine and cosine, tangent and capacitance.

The list thus covers a reasonable range of basic equations, with all the units given in the SI convention.

The Formulae option is useful for revision and allows you to enter a subject, such as "work". It then displays all the formulae relevant to that subject, in this case:

Work = voltage x charge
Work = power x time
Work = force x distance
Work = temperature x mass

If you read the section on Add Data in the instructions, this is what you see:

"You may add extra data by keying in your formulae (quantities in lower case) in the addition section. This data may then be saved and loaded from tape".

However, I find this feature very confusing and have still not managed to work out how to use it.

Presumably it lets you expand the subject range to include more varied equations and to load these as and when you need them.

This program could conceivably find a useful place in schools or for a revision aid at home for those unfortunate enough to need to recall a wide range of equations with ease.

But, sadly, it lacks the user-friendly approach which must surely be a priority for all educational software, and though probably an effective learning aid, it makes no attempt to use the BBC Micro's colour, sound or graphic facilities in any way.

Jane Jackson

Genned-up on sprites

Sprite-gen *DACC*

HOW many times have you had a good idea for a game but found that moving large numbers of objects around the screen has slowed everything down so much that the whole thing is pointless? Well, what you obviously need are some sprites.

Sprites are picture elements that can be made to move around the screen. They are normally generated with the aid of hardware but can also be formed and moved by software. The Sprite-gen program allows you to do just that in a painless manner.

The cassette contains the sprite generator program and two example games that use ready-defined sprites. Both games are listed in the 13-page manual and I was impressed that such effective games can be written in so few statements.

The sprite generator itself is easy to use. Sprites are defined on a 7 × 8 grid and because the program uses mode 2 any of the BBC Micro's 16 colours may be used. Larger objects can be defined by linking a number of sprites in the user program.

There are 32 sprites available although numbers 0 to 7 are the main ones. The rest are known as clones. A clone normally takes on the design of its associated sprite although this can be altered.

An added degree of animation can be included by careful use of the flashing colours. The example called Chopper Chase shows this admirably.

Any sprite can be simply placed in any position by a line of Basic. It is positioned by use of integer variables assigned to that particular sprite. For example, sprite 0 is allocated A% and B%. Thus to position sprite 0 at (640,512) you just key in:

```
100 A%=640:B%=512:
Z%=0:CALL&10A3
```

Z% contains the sprite number and the CALL merely invokes the machine code that displays the sprite. If A% or B% is updated and sprite 0 displayed again then the old image is deleted automatically. A nice addition is that by adding 256 to the sprite number that sprite is removed from the screen.

On defining a sprite two images are created, allowing smooth movement. The second image can, however, be defined to differ from the first allowing another level of animation.

Sprite-gen is a very useful utility. The examples are good to look at and fun to play. DACC have even more impressive demonstrations so it's very versatile. A minor omission is that it doesn't include a facility to detect when one sprite hits another. But that is a minor flaw in an otherwise impressive package.

Alan Plume

PHOENIX RISES YET AGAIN

Firehawks *Postern*

FIREHAWKS is yet another version of Galaxians, the old arcade game. A bunch of ravenous energy-consuming Firehawks drop from the top of the screen. They are trying to get to the bottom where they will regenerate into the legendary Phoenix. As they dive they're delayed by a series of plasma fields through which they have to weave their way.

Once past these there is only your spaceship's laser canon to hold them off. This is easier said than done as there are some 225 levels of difficulty – how anyone can play the higher levels defeats me. Yet I've seen it done!

While the noises it makes are the loudest I've ever heard on the BBC Micro, the graphics aren't all that impressive and the game itself appears simple and fairly standard at first. Not much to write home about you might think.

Then you see someone playing it and immediately want to have a go, convinced that you can do better. It can get quite compulsive and, at the higher levels, exasperating. It may be simple but it's fun. So, if you want a fast, action-packed version of an old arcade favourite then this will probably meet your needs.

Eileen Young

Feeling a bit peckish?

Snapper *Acornsoft*

SNAPPER is an attractive and incredibly frustrating version of Pacman. You have to guide a cute little yellow Snapper (complete with green hat) through the maze, gobbling dots and juicy looking cherries, strawberries and other fruits as you go.

The creatures who lurk in the cave in the centre of the maze are unfortunately trying to gobble you and, if they don't manage to corner you between them, one look at their enormous bulging eyes may well scare you rigid anyway.

Just so as not to make it too one-sided, if you eat any of the four flashing dots in the corners, you get 10 seconds in which to get your own back, and earn some bonus points as well, while the creatures are temporarily harmless.

When all the dots are eaten you tackle a new screenful. The game gets progressively faster and the value of the fruit also increases.

If you can make it to 15,000 points you earn another Snapper, and if you can get through 12 screenfuls you may get a glimpse of the ultimate prize – the Acorn.

You can play Snapper with the keyboard or with joysticks and both are good, with perhaps the joystick giving you the nearest feeling to the arcade versions.

A high-score table is included and the accompanying sound effects are very authentic.

Altogether, Snapper is one of the best versions of the game that I've seen. It's relatively easy to pick up the controls and to get fairly proficient at dot gobbling – but it's almost impossible to win.

Jane Jackson

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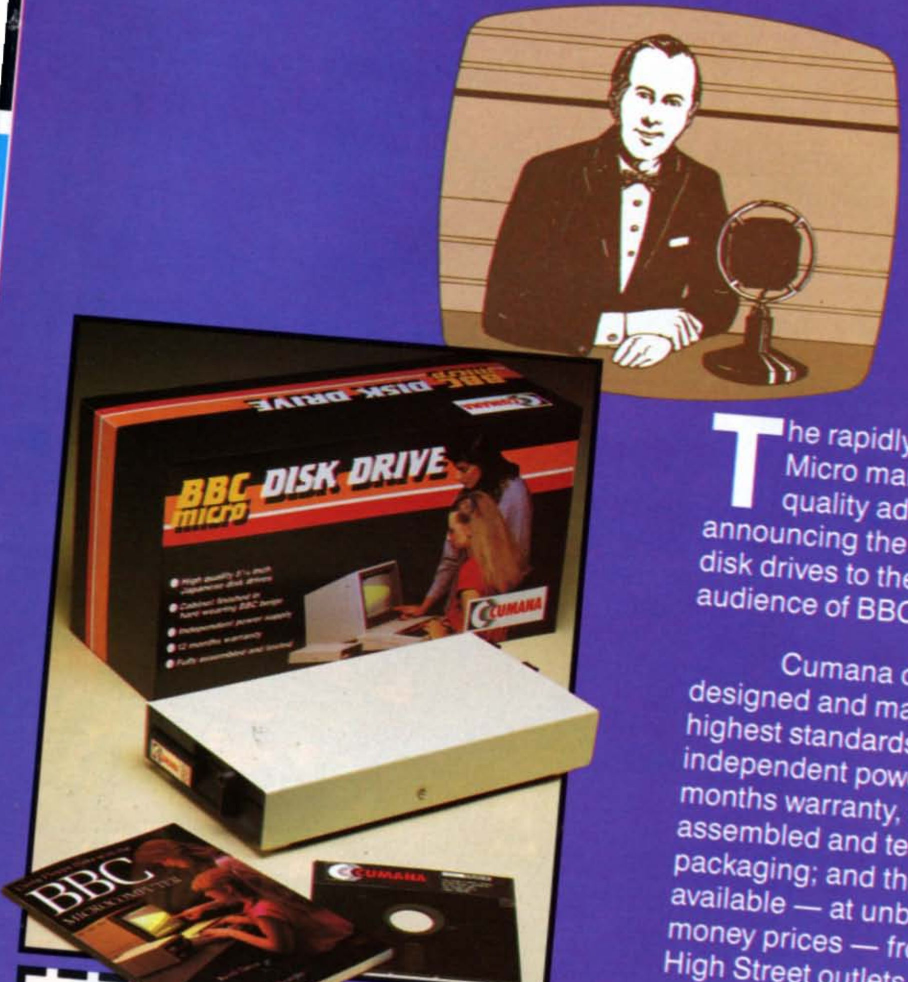

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Phantoms of Tower Bridge

THE GHOSTS at the Tower of London have left their usual haunts. They've taken the treasures from the vaults and scattered them all over Tower Bridge.

Your job as custodian is to gather up the treasures one by one and get them back to the bank for safe keeping.

The trouble is that the ghosts, while not harmful, are mischievous. If one catches you while you're on your way to the bank with some treasure, it will probably take it off you and put it back on Tower Bridge. And the bridge is opening and closing all the time.

Just to make it more frustrating, as soon as you've collected all the treasures and put them in the bank the ghosts scatter them all over the bridge again.

And this time there are more of them trying to thwart you!

Major Procedures

1330	**PROCinit** dimensions and sets up arrays used in program; also sets up user-defined characters and sound envelopes.
1500	**PROCsetup** sets up variables at start of each sheet.
940	**PROCscreen** sets up screen, as you might guess.
900	**PROCbridge** draws bridge.
650	**PROCman** animates man.
750	**PROCguard** animates each guardian ghost.
860	**PROCraise** raises/lowers bridge.
510	**PROCmanmove** reads keyboard and decides where to put man.
630	**PROCfall** moves falling man and finds out if he is in Thames.
700	**PROCthink** decides where to put ghosts.
1000	**PROCtower** draws towers.
1130	**PROChead** displays the title header.
1250	**PROCtell** displays instructions.
1560	**PROCerr** traps escape or displays any other errors.

Major Variables

A% = TRUE if man is dead.
C% = TRUE if man carrying treasure.
D% = TRUE if ghoul carrying treasure.
K% = Ascii value of key pressed.
M% = Number of lives left.
N% = Number of ghost being animated.
S% = Score to date.
T% = Number of treasures in bank.
U% = Height of bridge.
X% = Man's X co-ordinate.
Y% = Man's Y co-ordinate.
hi% = High score.
nc% = New character for man.
oc% = Old character for man.
no% = Level (number of ghosts).
up% = TRUE if bridge to be raised.
X%(N%) = X co-ordinate of ghost N%
Y%(N%) = Y co-ordinate of ghost N%

Complete listing starts on Page 127

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The whole family will enjoy DODGE_DAD, where you help a boy to find his hidden presents, avoiding his enraged father. Then you can try to escape from the magic MAZE that only appears as you move. If you're feeling athletic, why not try our SKI_SLOPE or Santa's SKITTLES?

You can help Santa with his Christmas deliveries in CRAZY_SANTA by dropping presents down the chimneys! Alternatively, you can try to pilot him safely onto the rooftops in LAND_SANTA.

FOREST_RUN has you guiding Santa to his sleigh, while in SNOWPUD you'll be steering the Christmas pudding through a blizzard.

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Alternatively, you might care to test your knowledge of carols (and your reactions) with CAROL_QUIZ.

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SNOWBALL
IX

SNOWBALL

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Snowball is a massive adventure with over 7000 locations. it took nine months to perfect and marks a new leap forward in adventure games – it has a detailed, planned background and is set aboard a huge starship that would really work. Snowball could be a glimpse of the future!

You play Kim Kimberley, security agent. Your mission is to guard the colony ship Snowball 9 from sabotage.

Thus when your freezer-coffin wakes you with the Snowball still in flight, you know that something must be very wrong. You're weakened and disorientated by lengthy hibernation, but the fate of the 5 mile long space-ship is in your hands!

Snowball is our new fourth adventure. Here's what the reviewers have just said about the first three:

"The Level 9 Adventures are superbly designed and programmed, the contents first rate. The implementation of Colossal Cave is nothing short of brilliant; rush out and buy it. While you're at it, buy their others too. Simply smashing!"

- SOFT, September 83

"Of the programs reviewed here, the only one that is wholly admirable is Level 9's Colossal Adventure."

- Your Computer, September 83

"I found Dungeon exceedingly well planned and wriiten, with a fast response. There are well over 200 locations and the descriptions are both lengthy and interesting."

- Computer & Video Games, September 83

"This has to be the bargain of the year . . . If adventures are your game, then this is your adventure".

- Home Computing Weekly, 30th August 83

"There are three excellent adventures on offer from Level 9 . . . the descriptions are so good that few players could fail to be ensnared by the realism of the mythical worlds where they are the hero or heroine . . . great fun to play."

- Which Micro?, August 83

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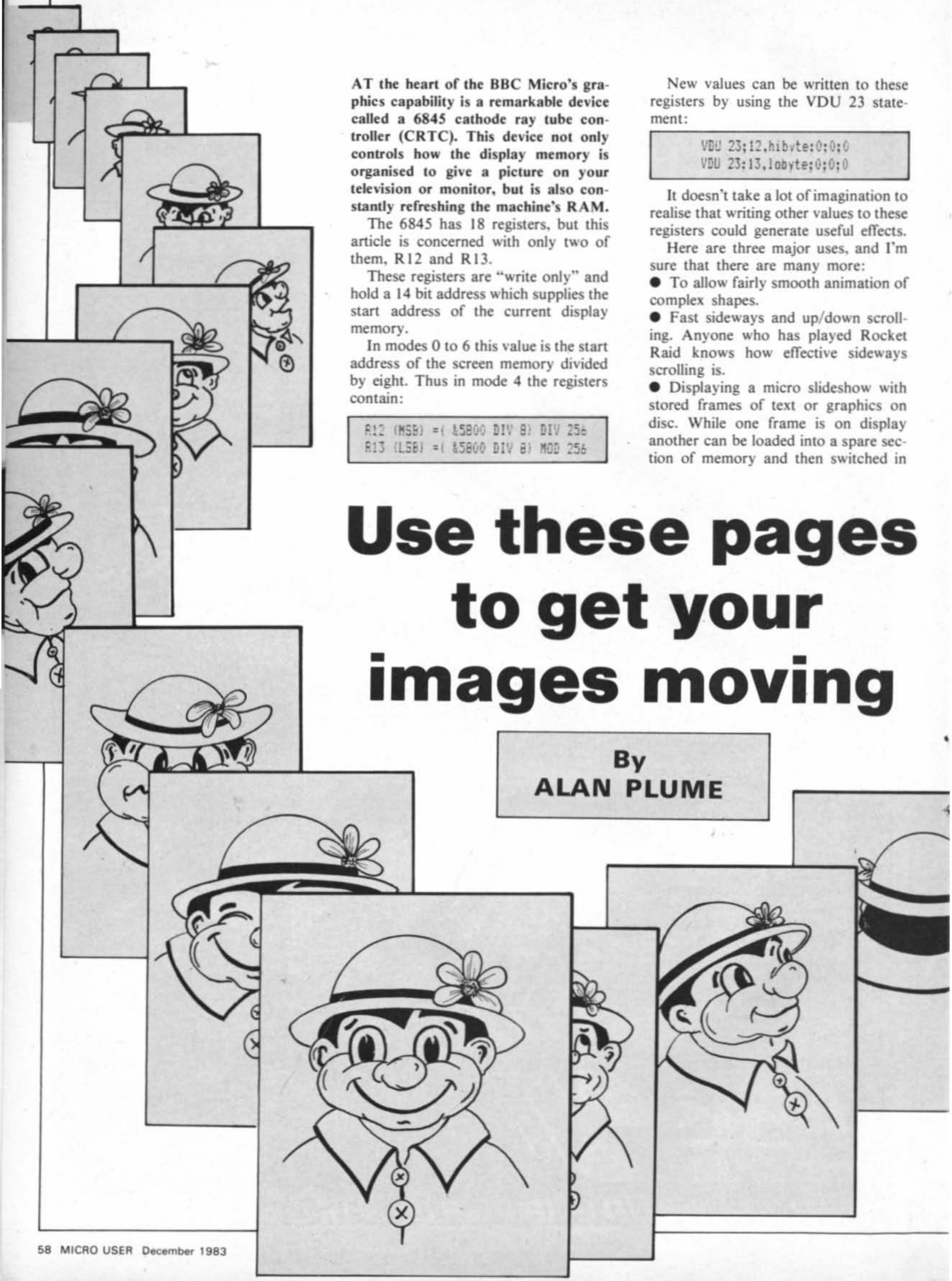
By ALAN PLUME



AT the heart of the BBC Micro's graphics capability is a remarkable device called a 6845 cathode ray tube controller (CRTC). This device not only controls how the display memory is organised to give a picture on your television or monitor, but is also constantly refreshing the machine's RAM.

The 6845 has 18 registers, but this article is concerned with only two of them, R12 and R13.

These registers are "write only" and hold a 14 bit address which supplies the start address of the current display memory.

In modes 0 to 6 this value is the start address of the screen memory divided by eight. Thus in mode 4 the registers contain:

```
R12 (MSB) =( &5800 DIV 8) DIV 256
R13 (LSB) =( &5800 DIV 8) MOD 256
```

New values can be written to these registers by using the VDU 23 statement:

```
VDU 23;12,hibvte;0;0;0
VDU 23:13,lobyte;0;0;0
```

It doesn't take a lot of imagination to realise that writing other values to these registers could generate useful effects.

Here are three major uses, and I'm sure that there are many more:

- To allow fairly smooth animation of complex shapes.
- Fast sideways and up/down scrolling. Anyone who has played Rocket Raid knows how effective sideways scrolling is.
- Displaying a micro slideshow with stored frames of text or graphics on disc. While one frame is on display another can be loaded into a spare section of memory and then switched in

by changing R12 and R13.

Obviously only modes 4 to 7 can be used for this, as the computer doesn't have enough RAM to support two mode 1 screens.

This is how we use these techniques for animation.

The original drawing is made in the normal memory for the appropriate mode.

While on display some pointers in the memory are altered and the next frame is actually drawn in another section of memory.

The address of the top of the new memory is written to R12 and R13 and the new frame seen. The old frame is deleted and the next frame constructed. This is then switched in. The process can be continued indefinitely.

Now let's see how all this is accomplished.

For this example mode 4 will be used. Normally the mode 4 screen uses memory locations &5800 to &7FFF, so if we use another page then that can be from &3000 to &57FF.

HIMEM must thus be established at &2FFF so that the program workspace doesn't overwrite the second page.

We also need to be able to clear both graphics pages quickly so we use a dedicated piece of assembler to do this. It's not too elegant, but works fast enough. Either page can be cleared by altering a single byte of the code.

Next we need to calculate the values of registers 12 and 13 of the 6845 to allow page changes. If we consider the area from &5800 to be page 1 and that from &3000 to be page 2 then we have:

```
R12 =(&5800 DIV 8) DIV 256 = 11
R13 =(&5800 DIV 8) MOD 256 = 0
R12 =(&3000 DIV 8) DIV 256 = 6
R13 =(&3000 DIV 8) MOD 256 = 0
```

When switching pages the operating system has to know what the current high byte of the screen start is.

This value is stored in the VDU workspace at &34E. Thus for page 2 we need to add:

```
?&34E=&30
```

and on switching back to page 1:

```
?&34E=&58
```

Now how do we tell the operating system that we want to draw on page 2?

Locations &350 and &351 appear to contain the base address that the plotting and printing routines use to place information on the screen, so we also need:

```
Page1   ?&350=0:?&351=&58
Page2   ?&350=0:?&351=&30
```

All this poking around in memory is exactly what Acorn tell you not to do, but if you want special effects you often have to do this.

Program I is an example of this technique used to display a wireframe cube rotating about two axes with perspective.

The program is written to allow you to put your own objects in fairly easily

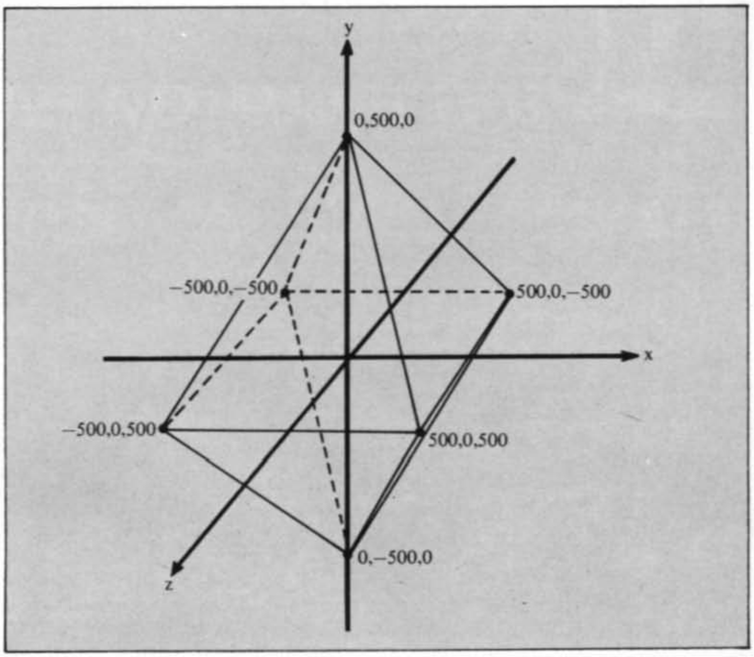
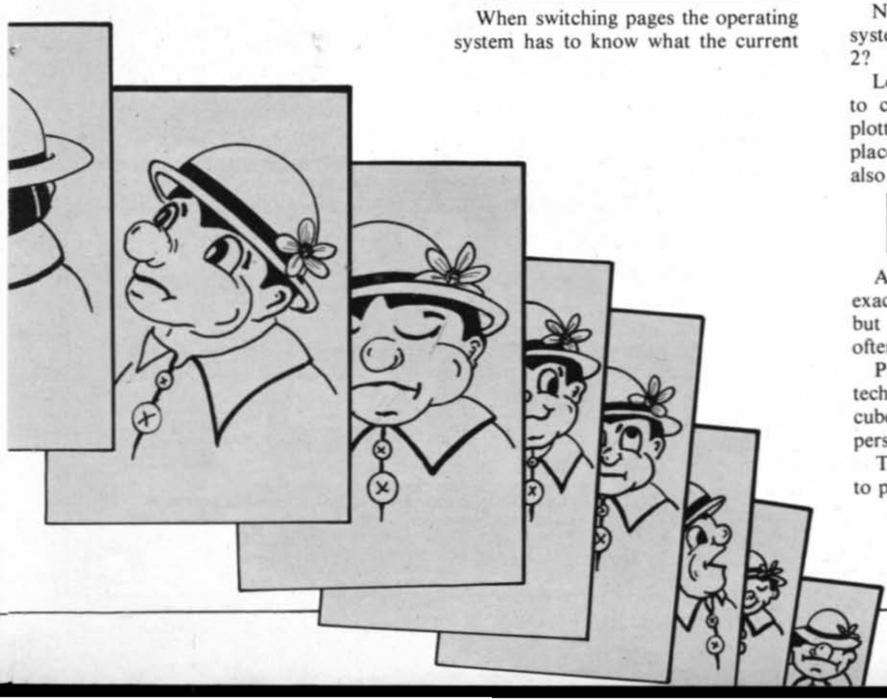


Figure I



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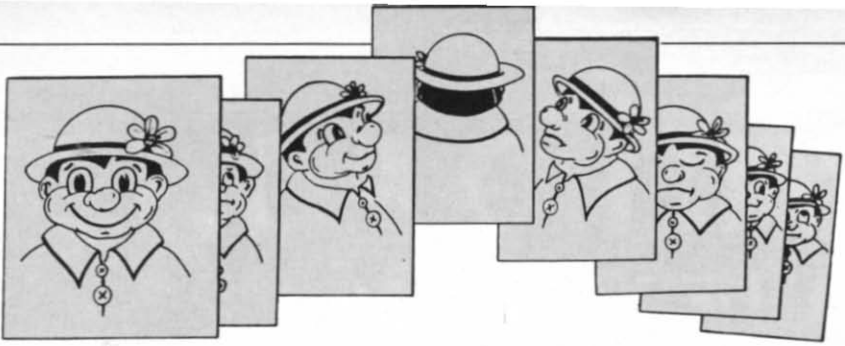

From Page 59

by altering the DATA statements at lines 3000 and 3010.

The first set of data contains the number of points defining the object and its x, y and z co-ordinates. The second data set contains the number of lines and the linkages for these lines.

To illustrate this is a diagram of a three dimension diamond shape and the associated data statements. (Note that the z-axis is the axis coming out of the screen.)

```
3000 DATA 6, -500, 0, 500, -500, 0,
-500, 500, 0, -500, 500, 0, 500, 0,
500, 0, 0, -500, 0
3010 DATA 12, 1, 2, 2, 3, 3, 4, 4, 1,
1, 5, 2, 5, 3, 5, 4, 5, 1, 6, 2, 6, 3,
6, 4, 6
```

The rotation procedure at lines 1500 to 1520 is also designed to allow the user to alter the axes of rotation, and even the angles of rotation. The parameters A11 to A33 are initialised in PROCsetup. As an example, to rotate about the z-axis only:

```
1620 A11=C:A21=S:A31=0
1625 A12=-S:A22=C:A32=0
1630 A13=0:A23=0:A33=1
```

```
  10 MODE 4
  20 HIMEM =&2FFF
  60 VDU 29,640;512;23;8202;0;0;0;
  70 *FX4,1
  80 PROCass
  90 PROCpts
 100 PROClines
 110 PROCsetup
 150 REPEAT
 160 PROCtwod
 170 PROCpage1
 190 PROCrotall
 200 PROCtwod
 210 PROCpage2
 220 PROCrotall
 230 UNTIL FALSE
 680 DEF PROCtwod
 690 REM Convert to 2D coords.
 700 FOR C%=1 TO P%
 710 D=2500/(D%-Z(C%))
 720 U%(C%)=X(C%)*D
 730 V%(C%)=Y(C%)*D
 740 NEXT
 750 ENDPROC
 760 DEF PROCpage1
 770 ?&34E=&58
     :?&350=0
     :?&351=&58
 780 PROCdraw
 830 VDU 23;12,11;0;0;0;23;13,0;0;0;0;
 840 ?(repeat+2)=&30
     :CALL clg
 850 ENDPROC
1210 DEF PROCpage2
1220 ?&34E=&30
     :?&350=0
     :?&351=&30
1240 PROCdraw
1260 VDU 23;12,6;0;0;0;23;13,0;0;0;0;
1270 ?(repeat+2)=&58
     :CALL clg
1280 ENDPROC
1500 DEF PROCrotall
1501 FOR C%=1 TO P%
1505 X=X(C%)
     :Y=Y(C%)
     :Z=Z(C%)
1510 X(C%)=X*A11+Y*A12+Z*A13
1512 Y(C%)=X*A21+Y*A22+Z*A23
1515 Z(C%)=X*A31+Y*A32+Z*A33
1517 NEXT
1520 ENDPROC
1550 DEF PROCdraw
1555 FOR C%=1 TO L%
1560 J%=S%(C%)
     :K%=E%(C%)
1565 MOVE U%(J%),V%(J%)
1570 DRAW U%(K%),V%(K%)
1580 NEXT
1590 ENDPROC
1600 DEF PROCsetup
1605 D%=5000
1610 A=PI /30
1615 C=COS (A)
     :S=SIN (A)
1620 A11=C*C
     :A21=S*C
     :A31=-S
1625 A12=-S
     :A22=C
     :A32=0
1630 A13=A21
     :A23=S*S
     :A33=C
1635 ENDPROC
1700 DEF PROCass
1705 REM Assemble clear graphics
      code.
1710 DIM F% 30
1720 [OPT 2
1725 .clg LDA#0
1730 LDX#0
1740 LDY#40
1745 .repeat STA&5800,X
1750 INX
1755 BNE repeat
1760 INC repeat+2
1765 DEY
1770 BNE repeat
1775 RTS
1780 ]
1785 ENDPROC
1800 DEF PROCpts
1805 REM Read in points data.
1810 READ P%
1815 DIM X(P%),Y(P%),Z(P%),U%(P%)
     ,V%(P%)
1820 FOR C%=1 TO P%
1825 READ X(C%),Y(C%),Z(C%)
1830 NEXT
1835 ENDPROC
2000 DEF PROClines
2005 REM Read in lines data.
2010 READ L%
2015 DIM S%(L%),E%(L%)
2020 FOR C%=1 TO L%
2025 READ S%(C%),E%(C%)
2030 NEXT
2035 ENDPROC
3000 DATA 8,-500,500,500,500,500
     ,500,500,-500,500,-500,-500
     ,500,-500,500,-500,500,500,-500
     ,500,-500,-500,-500,-500,-500
3010 DATA 12,1,2,2,3,3,4,4,1,1,5
     ,2,6,3,7,4,8,5,6,6,7,7,8,8,5
```

Program I

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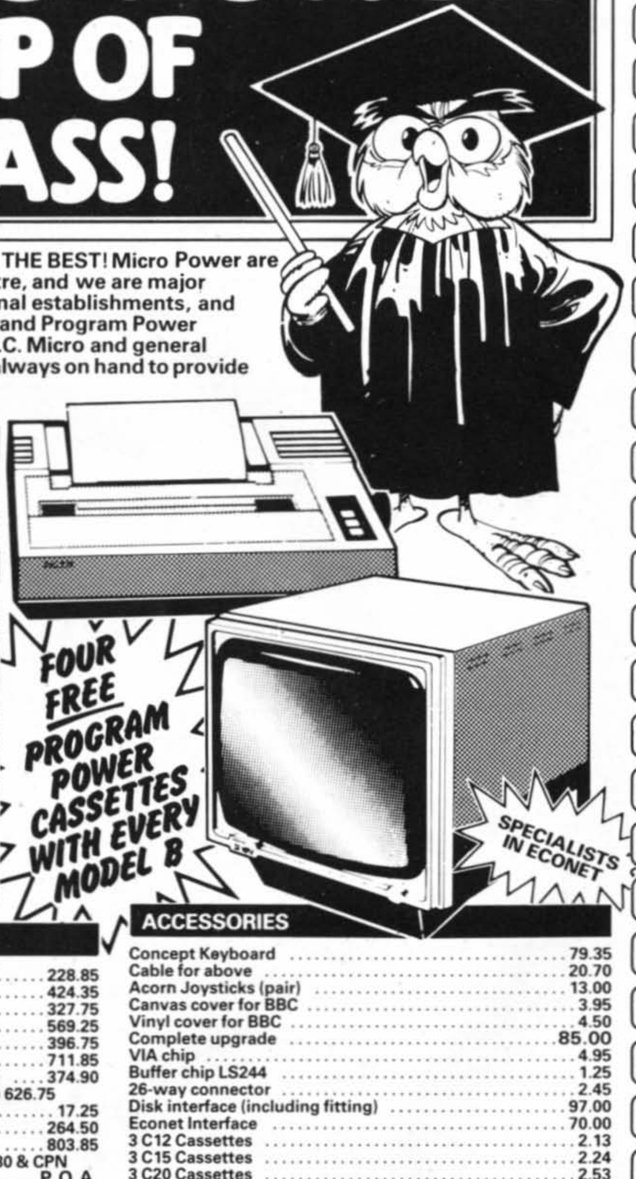
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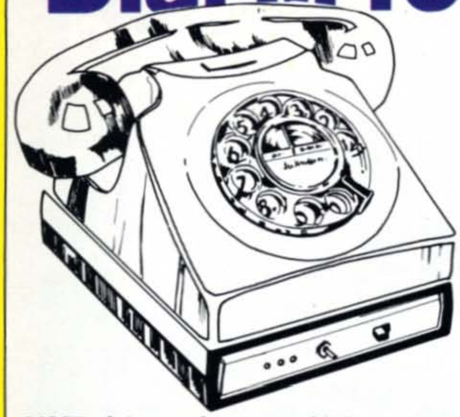

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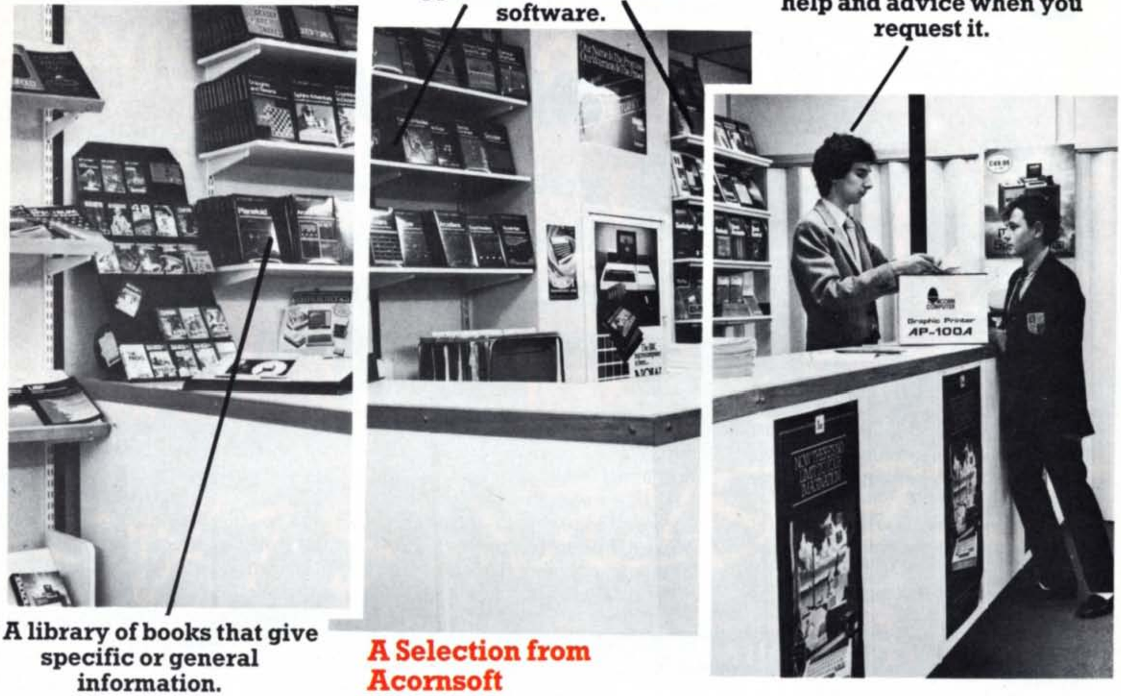

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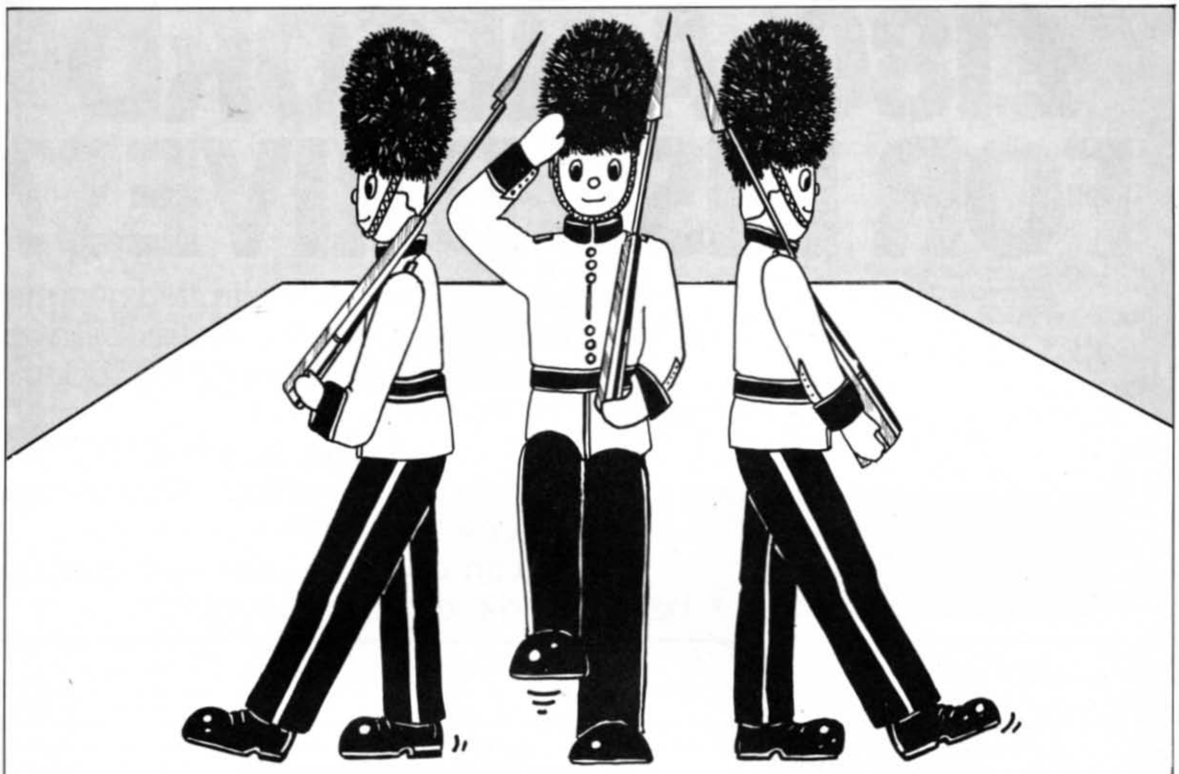

BY THE LEFT (PROGRAM) QUICK MARCH!

THIS program is designed to take the tedium out of defining and manipulating user definable characters and allows any number from 1 to 9 to be redefined at the same time.

The characters are displayed as a block of 3x3, so they may be nine individual shapes or one large one. The whole block may then be manipulated into other orientations, and the program will produce the necessary commands.

The manipulations of the block allowed by the program are:

1. Rotate right.
2. Rotate left.
3. Mirror image (left to right).

There is no limit to how many times each may be carried out, so a great variety of orientations is available. For example, a double rotation right or left will give an inversion.

The characters displayed may be edited at any time, so if the characters are defined and rotated and a change is required in the new orientation, it can be easily carried out and the commands for the new shape will be produced.

The mirror image facility is particularly useful. If characters are drawn to create a man walking from left to right the computer will give the commands needed. Then by using the mirror image, the commands needed to walk in the opposite direction will be produced with no additional effort.

By
MICHAEL
MURRAY

Similarly, the commands to make him walk up the side of the screen may be produced using rotate and mirror image.

When the program is run the user will be presented with a grid representing 3x3 characters, sub-divided into the individual pixels. A cursor will appear in the top left hand pixel, and this may be moved anywhere in the grid using the cursor control keys.

When the cursor is at the correct position the pixel may be set by pressing COPY. To draw a continuous line the COPY key can be held down while the cursor keys are operated.

A diagonal line may be drawn by using two cursor keys at the same time. Any pixel may be unset by moving the cursor to it and pressing Delete. Lines may be deleted by holding the Delete key down while operating the cursor keys.

It is not necessary to use all the characters available, only as many or as few as are wanted. When the characters are completed to the user's satisfaction pressing Return will cause the cursor to disappear.

After a short pause, during which the computer is doing its calculations, the commands that have been used to produce the characters that have been drawn will appear, each character

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From Page 67

being drawn alongside the relevant command.

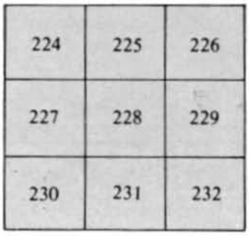
At the bottom of the screen the whole block will be printed in two forms. The first is the form of the block in 40 column mode and the second is as it will appear in 20 column mode. After the commands have been examined, and noted if required, pressing the Space bar produces a menu to allow:

A. Start again from scratch.
B. Re-draw the characters just defined (in case changes are wanted
C. Rotate the whole block of characters to the right and display them on the original grid.
D. Rotate to the left and display.
E. Create and display a mirror image.
F. Exit from the program.

When options B-E are selected the resulting display may be edited using the cursor keys, Copy and Delete. Pressing Return will then produce the commands for the amended display.

If options C-E are selected pressing Return without editing will produce the commands for the original characters in the new orientation.

The redefinable characters used in this program are 224-232, as shown in Figure I, but there is no reason why these need to be used.



224	225	226
227	228	229
230	231	232

Figure I

It is the parameters which follow that are important, and these may be used in a VDU23 statement to redefine any character required by the user to give the shape that he has drawn.

If the whole block is to be treated as a single figure it may be printed as a compound VDU statement, for example:

```
VDU224, 225, 226, 8,  8, 8, 10,
227, 228, 229, 8, 8, 8, 10, 230,
231, 232
```

This is demonstrated in line 900 of the listing. However if this is to be done frequently it is better to assign the whole figure to a string.

For example, if a figure has been drawn using the four top left hand characters:

```
FIG$=CHR$(224) + CHR$(225)
+ CHR$(8) + CHR$(8) +
CHR$(10) + CHR$(227) +
CHR$(228)
```

Thus PRINT FIG$ will produce the figure. Printing a string in this manner is faster than using a compound VDU statement.

Note that CHR$(8) moves the print cursor back one space and CHR$(10) moves it down one line. If these were not included the figure would appear in a straight line.

The main program is lines 130-200. Line 150 dimensions the array into which the parameters for each character are to be placed, that is characters 0-8, parameters 0-7.

Lines 160-180 draw the initial figure and produce the commands while line 190 enables repeated changes and manipulations to be made.

PROCGRID draws the basic grid. Each grid square is 40x40, so that when a pixel is filled with a 32x32 character the grid lines are preserved.

Line 260 is to print the lines representing character positions in white and those representing pixels in red.

Line 340 defines the cursor and 350 the pixel filler character.

PROCDRAW is the procedure to draw the characters. Lines 420-430 place the cursor in the top left of the grid. Lines 440-580 control drawing until Return is pressed.

Line 450 is a time delay that can be altered to suit the user. Line 460 stores the current cursor position. Lines 470-500 calculate the new position according to which cursor keys are being pressed, and lines 510-520 keep the cursor within the grid.

Line 530 deletes the cursor from its old position. Lines 540 and 570 draw it in the new position.

Line 550 deletes any pixel in the new position if Delete is pressed, while line 560 sets the pixel if Copy is pressed.

Line 590 removes the cursor after Return has been pressed.

PROCCOMMANDS examines the grid to determine which pixels are set and calculates the parameters required in a VDU23 statement to produce each of the nine characters.

Line 660 is for the three rows of characters, line 670 is for the three characters in each row and line 680 is for the eight parameters in each character.

Lines 690-720 convert the binary representation of each character into a number, the left hand pixel of each row of each character being worth 2^7, decreasing to 2^0 for the rightmost pixel.

As each parameter is calculated it is stored in an array by line 730. Lines 770-790 read the values in the array and use them to redefine characters 224-232.

Lines 800-870 print the commands used to define the characters and display the characters thus defined immediately afterwards.

Lines 890-900 display the 3x3 block of characters at the bottom of the screen while line 910 calls a procedure that simulates the appearance of the block in 20 column modes.

Line 920 holds up the program until the SPACE bar is pressed.

PROCMODES extends the horizontal scale of each character by two to simulate its appearance in the 20 column modes.

PROCROTATE_R reads the array of parameters and manipulates it to produce a display rotated to the right. Lines 1220-1230 determine the start point for each character, and 1240-1250 the start of each row (represented by one parameter) within the character.

Lines 1260-1280 convert the value of each parameter into a binary representation and sets the pixels in the grid to show this. Due to the rotation they will be set top to bottom instead of left to right.

PROCMIRROR and PROCROTATE_L are similar to PROCROTATE_R, but with slightly different manipulations of the parameters to give a mirror image and a rotation to the left respectively.

PROCCHOICE is a simple menu selection routine to allow the user to choose his next option and execute it.

Listing starts on Page 112

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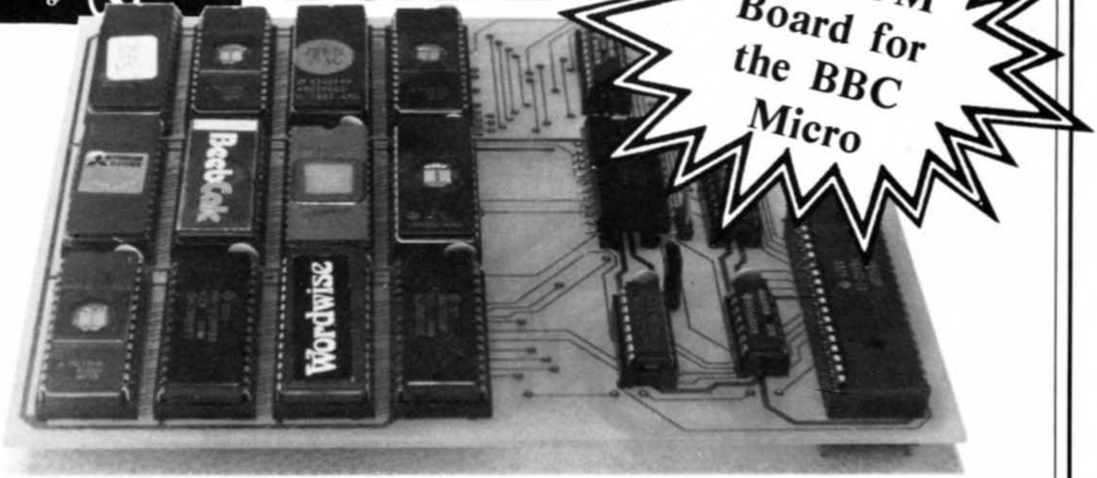

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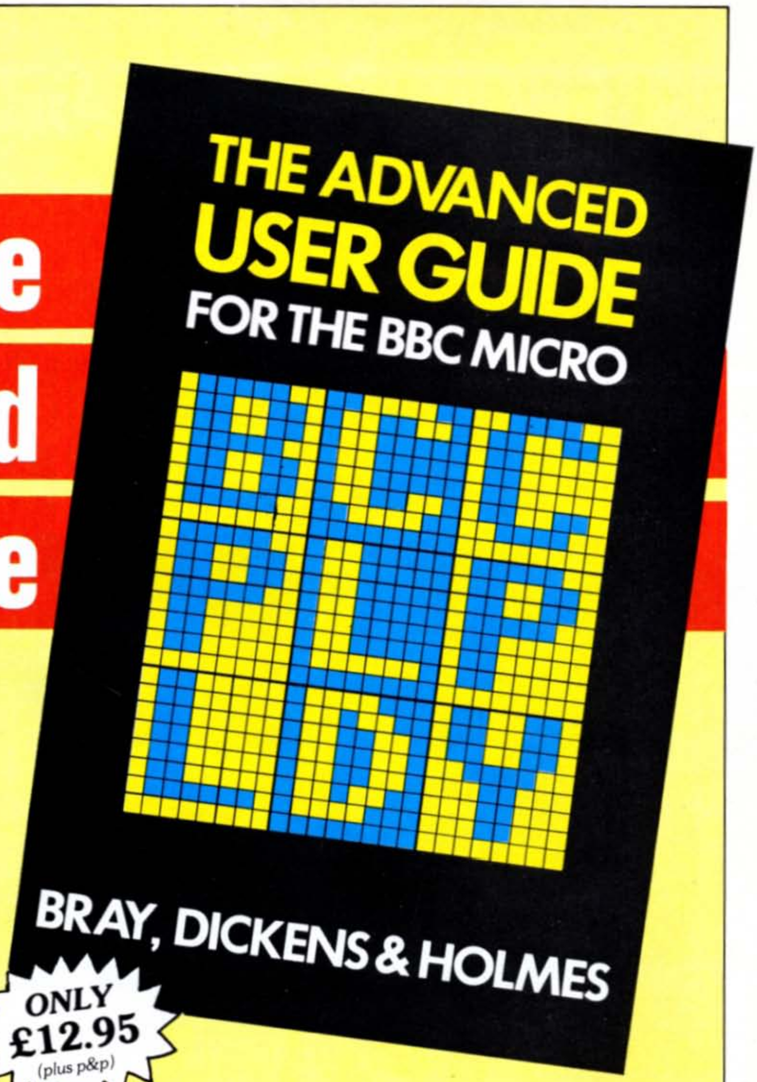

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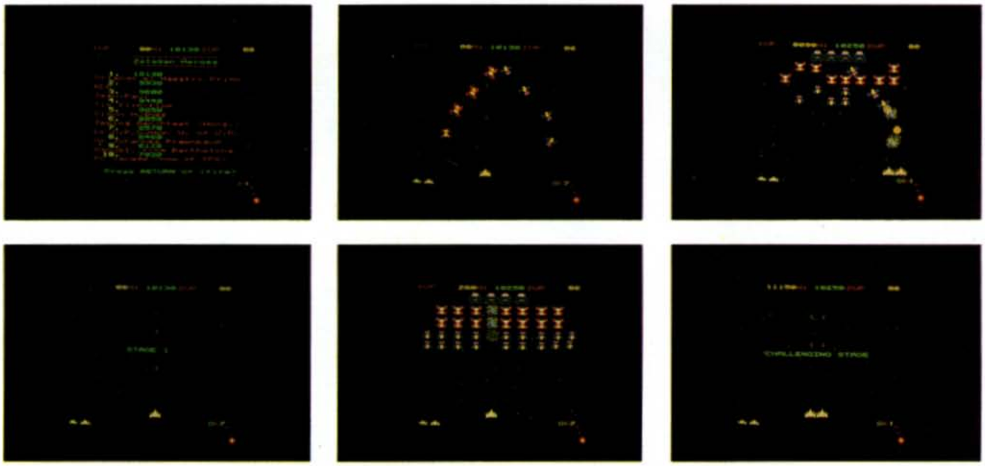

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Unfortunately the reindeer did not like being made redundant and they formed an action group. Now reindeer have a foul temper so they will stop at nothing to prevent Santa from delivering his presents.

Santa will be busy making up the presents, so he needs someone to fly the ship and drop them into chimneys. You are the one to complete this task! The world is depending on you. There are about 200,000 million houses to deliver to, so you will get plenty of practice.

The number of presents to be delivered to each house is shown on the screen, and you must drop them down its chimney. You only have a limited number of presents for each city – if you run out of presents you will be sacked.

Santa cannot bear inefficiency (see what happened to the reindeer) so you must deliver at least 60 per cent of the presents safely.

Presents are lost if you drop them on the roof of a house or on a plane, or if they are shot by the reindeer. The reindeer have an AA gun and a plane to attack you with, and their shooting becomes more accurate as the game progresses.

Instructions concerning movement are given in the program.

Listing starts on Page 136

List of procedures

PROCSMO checks to see which keys are being pressed and moves Santa's ship accordingly.

PROCPRDR is called whenever a present is dropped, and sets up the variables for the present.

PROCPRMO moves the present downwards and checks to see if it hits anything.

PROCINIT sets up the variables at the start of each new sheet.

PROCMISET is called whenever a missile is fired by the AA gun, and initialises the variables used by the missile.

PROCDELAY (X) causes a delay of X centiseconds.

PROCHOUSE (X, Y) draws a house at X, Y.

PROCSCREEN initialises the screen.

PROCTM moves the turret of the AA gun.

PROCMI moves the missile fired by the gun and checks to see if it hits anything.

PROCSCORE (X) adds X points to the score and displays the new score.

PROCPREZ decreases the number of presents the player has and displays this number.

PROCWINDOW (X) draws a man in the window of the house specified.

PROCDEL calculates and displays the percentage of presents delivered safely.

PROCPRNO (X) displays information about the number of presents to be delivered to the house specified.

PROCINSTRUCTIONS no prizes for guessing!

PROCTUNE (X) plays tune X. O=Jingle Bells, 1=Congratulations.

The main program variables are:

HO%(4) data concerning the houses.

HI%(4,1), HI$(4) high score variables.

SC% score.

DEL% number of successful deliveries.

TP% total number of presents dropped.

BAPRES%, PRES% number of presents the player has.

MILOC% determines the accuracy of the missiles fired by the AA gun.

X%, Y% co-ordinates of Santa's ship.

PR% flag determining state of present.

PRX%, PRY% present's co-ordinates.

PRDES% total number of presents to be delivered.

MIA% flag determining whether the plane or the missile is to be moved.

N%, M% general loop variables.

I%, X, Y used to pass parameters in procedures.

MI%, MI2%, MI3%, MI4%, MIS%, MIS2% used to position and move missile.

RP%, RP2% plane co-ordinates.

V%, V1% sound volume variables.

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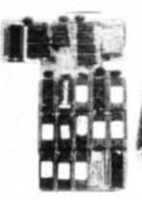

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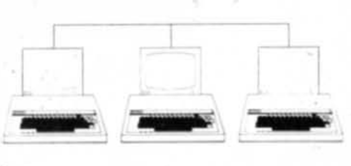

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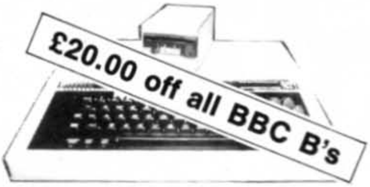

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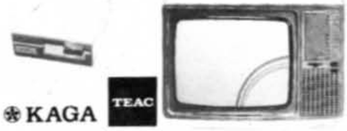

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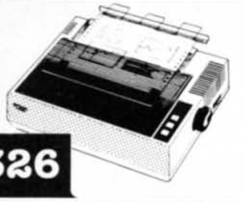

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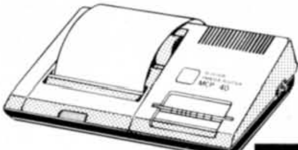

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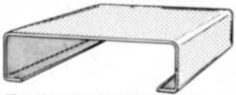

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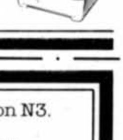

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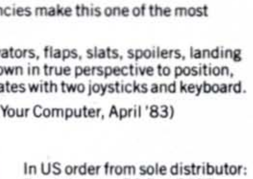

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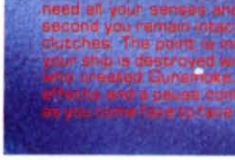

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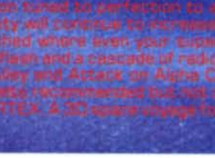

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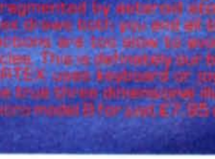

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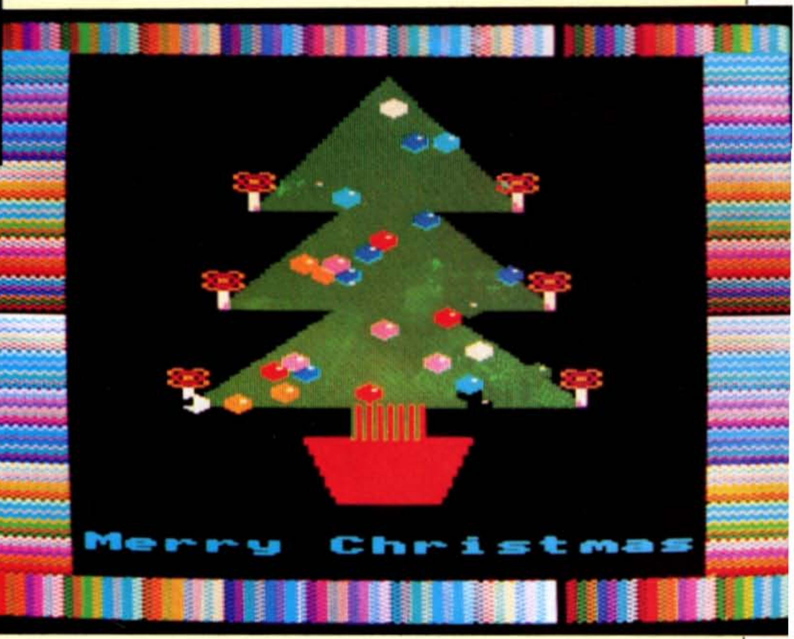
Type it in before your Christmas pudding or you might not be up to it!

Let Santa Linda deliver your Christmas cards



```
 10 REM *******************
    ********
 20 REM *** A CHRISTMAS
     CARD ***
 30 REM *** by Linda Stoneb
    anks ***
 40 REM *** C The Micro
     User ***
 50 REM *******************
    ********
 60 *KEYOMODEO!MVDU14!ML.!M
 80 VDU 23;11,0;0;0;0;
    :REM DELETE CURSOR
 90 VDU 23,224,24,24,24
    ,24,24,24,24,24
100 VDU 23,225,8,28,62
    ,62,62,62,28,8
110 VDU 23,226,0,0,0,24
    ,24,0,0,0
120 VDU 23,227,0,24,36
    ,66,66,36,24,0
130 VDU 23,228,&66,&81
    ,&81,0,0,&81,&81,&66
140 ON ERROR VDU 14
    :VDU 20
    :REPORT
    :PRINT " at line ";
    ERL ,
    :STOP
150 ENVELOPE 1,6,0,0,0
    ,3,16,16,125,-5,-15
    ,-15,126,60
160 MODE 2
    :octave$="cCdDefFgGaAb"
    :REM CAPS=# (C=c sharp)
170 FOR hsize=5 TO 70
     STEP 15
180 vsize=hsize
190 CLS
    :PROCtree(640,512)
    :PROCdelay(50)
200 NEXT hsize
210 FOR hsize=15 TO 95
     STEP 15
220 FOR vsize=5 TO 65
     STEP 15
230 CLS
    :PROCtree(640,512)
    :PROCdelay(50)
240 NEXT vsize
250 NEXT hsize
260 CLS
270 hsize=13
    :vsize=13
280 FOR X=160 TO 1200
     STEP 320
290 FOR Y=100 TO 900
    STEP 200
300 PROCmusic
    :PROCtree(X,Y)
310 NEXT Y
320 NEXT X
330 PROCdelay(150)
    :CLS
340 hsize=50
    :vsize=55
350 PROCtree(640,550)
360 PROCtrunk(-1,1,-4
    ,-3)
370 PROCballs
380
390
400 VDU 29,0,0
    :colour1=0
    :colour2=1
410 FOR X=0 TO 1279
    STEP 16
420 PROCmusic
430 FOR Y=0 TO 64 STEP 8
440 GCOL 0,colour1
    :PLOT 69,X,Y
    :PLOT 69,X+8,Y+4
    :REM BOTTOM LINE
450 PLOT 69,X,Y+955
    :PLOT 69,X+8,Y+959
    :REM TOP LINE
460 GCOL 0,colour2
    :PLOT 69,X+8,Y
    :PLOT 69,X,Y+4
470 PLOT 69,X+8,Y+955
    :PLOT 69,X,Y+959
480 NEXT
490 colour1=colour1+1
    :IF colour1=8
    THEN colour1=0
    :colour2=colour2+1
    :IF colour2=8
    THEN colour2=colour1
500 NEXT
510
520
530 VDU 29,0,0
    :colour1=0
    :colour2=1
540 FOR Y=72 TO 953
    STEP 8
550 PROCmusic
560 FOR X=0 TO 128
    STEP 16
570 GCOL 0,colour1
    :PLOT 69,X,Y
    :PLOT 69,X+8,Y+4
    :REM LEFT
580 PLOT 69,X+1143,Y
    :PLOT 69,X+1151,Y+4
    :REM RIGHT
590 GCOL 0,colour2
    :PLOT 69,X+8,Y
```

Turn to Page 121

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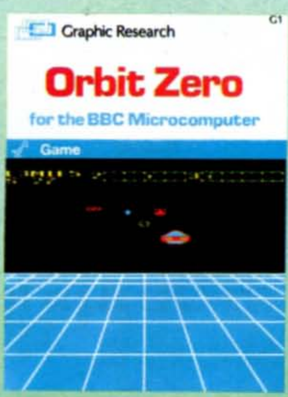
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THE Editor crept up behind me as I was finishing Peters' First Concerto for BBC Micro (with optional disc drive accompaniment). The first I knew of it was when he pressed Break and started cackling as he saw the look on my face.

"Cheer up", he crowed, "you're taking all this sound and music too seriously. It's getting out of proportion".

"In fact", he added, "you should keep it all in scale".

He reached his office before I reached him.

Not top of the pops perhaps, but try playing this

By NIGEL PETERS

SURPRISINGLY he was more accurate than he thought because this month we'll be covering musical scales. Not that I intend to give you a music lesson – I wouldn't dare – but I will show you the basics of producing simple tunes with your micro.

In the last article we examined the SOUND command and learned how to use it to produce noises. Each of these separate noises is technically called a note and by putting together a series of notes we get a tune.

It should be pointed out that some series of notes are more tuneful than others – as you may have found with the random music generator!

This is because the human ear has come to expect a certain consistency in the notes that make up tunes.

It wants them to go up and down, or change pitch, by regular amounts. Try running Program I.

This goes upwards in a series of steps called semitones. It does this by adding four to the pitch parameter of the SOUND command each time round the loop.

These semitones are the natural building blocks of western music. When tunes go up and down in pitch (higher or lower, soprano or bass) they tend to do so in semitones or groups of semitones.

Even though Program I will probably have you pressing Escape before its end, you'll find it a lot more acceptable than Program II which goes up in steps of one, a quarter of a semitone.

Since we've been talking about semitones you might expect that we'll be coming to whole tones and this we do with Program III.

This program plays a series of notes, each successive note being raised in pitch by one tone (or two semitones). So increasing the pitch parameter by four raises the note by a semitone; increasing it by eight produces a note one whole tone higher.

Higher notes require different combinations of four and eight to be added to the pitch parameter.

The trouble with the previous programs is that although they worked in tones and semitones, the natural building blocks of music, they were boring.

They leave you with that "waiting for the other boot" feeling!

This is because our ears not only expect tunes to be composed of notes which vary in pitch by tones and semitones, but also they prefer certain selections of the available notes. Try running Program IV.

Much more satisfying, isn't it? It has a complete feeling about it.

After the first note is played the following notes are increased in pitch by the amounts shown in the DATA statement.

As you'll expect by now, these

→

```
10 REM PROGRAM I
20 FOR pitch=0 TO 255 STEP 4
30 SOUND 1,-15,pitch,20
40 SOUND 1,0,pitch,20
50 NEXT pitch
```

Program I

```
10 REM PROGRAM II
20 FOR pitch=0 TO 255 STEP 1
30 SOUND 1,-15,pitch,20
40 SOUND 1,0,pitch,20
50 NEXT pitch
```

Program II

```
10 REM PROGRAM III
20 FOR pitch=0 TO 255 STEP 8
30 SOUND 1,-15,pitch,20
40 SOUND 1,0,pitch,20
50 NEXT pitch
```

Program III

```
10 REM PROGRAM IV
20 pitch=50
30 REPEAT
40 SOUND 1,-15,pitch,20
50 READ increase
60 pitch=pitch+increase
70 UNTIL increase=0
80 DATA 8,8,4,8,8,8,4,0
```

Program IV

```
10 REM PROGRAM V
20 REPEAT
30 READ note
40 IF note=0
   THEN END
50 SOUND 1,-15,note,10
60 UNTIL FALSE
70 DATA 30,30,38,26,30,38,0
```

Program V

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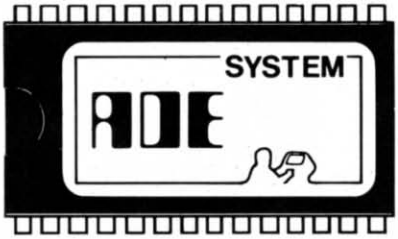

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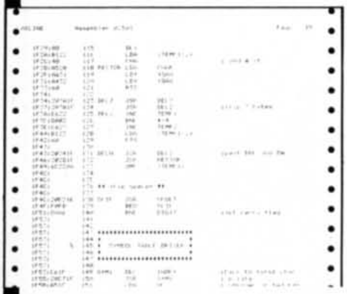

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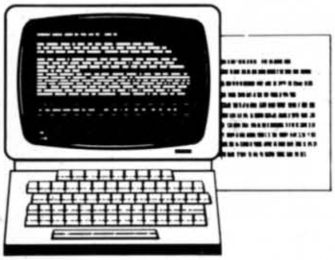

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From Page 83

increments are all fours and eights, but they are in an order that sounds pleasing to the ear.

This is known as a scale, and most tunes are made up of combinations of notes picked from one scale.

To recap, nearly all the tunes you know consist of series of notes whose pitch changes in multiples of tones and semitones. The notes go up and down in discrete bundles made up of these measures and most tunes confine themselves to a selection of the available notes.

What this means for the BBC Micro is that if you're trying to write a tune you know that after you've picked the start note all the other notes will have the start note's pitch parameter varied by factors of four or eight.

Of course the channel, loudness and duration of the note may vary as well but in this article let's concentrate on the pitch.

It's much easier to use in practice than to describe. Try running Program V.

This produces a fairly uninspiring version of a well-known tune. It's hardly wonderful music but you can see from the DATA statement how the pitch parameter of the notes varies by factors of four or eight from the pitch parameter of the first note.

Once I had the first note it was just a matter of figuring out whether the next note was up or down and adding or subtracting the fours and eights as necessary.

Then I just put them in a DATA statement and let the loop read the pitch and play the tune.

You can play your own tunes by putting in your own DATA statements. The problem is that you have to figure out which DATA statements produce which notes. Program VI will help you with this.

It is a very simple one which allows you to write micro music by ear.

It begins by asking you for the pitch and duration parameters of the tune's first note. The micro then plays this and asks you if you want to keep it.

If you do, it will save the note and ask you if you want to play the tune. The program carries on like this, asking for the parameters of notes, playing them and, if required, saving them.

When you finally decide to hear the tune it will play it and display the DATA statement values used.

It's simple to write tunes using this program. When you want to play them just modify PROCreadnote and PROCplaystring.

Of course, this has been a fairly limited treatment. Only one of the BBC Micro's four channels has been used, and we haven't varied the loudness at all. Also we've avoided playing more than one note at a time and producing harmonies.

All this, and more, will follow. But I have to finish now. I've been working for far too long for too little pay, so I'm going into the Editor's office, waking him up and demanding a raise.

I call it making my pitch.

```
 10 REM PROGRAM VI
 20 counter=1
 30 PROCnote
 40 PRINT
   :PRINT
 50 PRINT "Data Statements:"
 60 PRINT
   :PRINT
 70 PRINT tune$
 80 END
 90 DEF PROCtune
100 REPEAT
110 PROCreadnote
120 PROCplaystring
130 UNTIL counter>=LEN (tune$)
140 ENDPROC
150 DEF PROCnote
160 CLS
170 INPUT "Pitch of note?"pitch
180 PRINT
   :PRINT
190 INPUT "Duration of note?"duration
200 PRINT
   :PRINT
210 SOUND 1,-15,pitch,duration
220 PRINT
   :PRINT
   :PRINT
230 PROCkeepnote
240 ENDPROC
250 DEF PROCkeepnote
260 PRINT "Keep this note?"
270 PRINT "Press Y and Return for
     YES"
280 PRINT "Any letter and Return
     for NO"
290 PRINT
   :PRINT
300 INPUT key$

310 IF key$="Y" OR key$="y"
   THEN PROCstring
   ELSE PROCnote
320 ENDPROC
330 DEF PROCstring
340 tune$=tune$+STR$ (pitch)+","
     +STR$ (duration)+","
350 CLS
360 PRINT "Play the tune now?"
370 PRINT
   :PRINT
380 PRINT "Press Y and Return for
     YES"
390 PRINT "Any other letter and Retur
   n for NO"
400 INPUT key$
410 IF key$ ="Y" OR key$ = "y"
   THEN PROCtune
   ELSE PROCnote
420 ENDPROC

430 DEF PROCplaystring
440 pitch=VAL (pitch$)
450 duration=VAL (duration$)
460 SOUND 1,-15,pitch,duration
470 SOUND 1,0,pitch,0
480 ENDPROC
490 DEF PROCreadnote
500 pitch$=""
510 REPEAT
520 IF MID$(tune$,counter,1)<>","

   THEN pitch$=pitch$ +MID$(tune$
   ,counter,1)
530 counter=counter+1
540 UNTIL MID$(tune$,counter-1,1)=
   ","
550 duration$=""
560 REPEAT
570 IF MID$(tune$,counter,1)<>","

   THEN duration$=duration$ +
   MID$(tune$,counter,1)
580 counter=counter+1
590 UNTIL MID$(tune$,counter-1,1)=
   ","
600 ENDPROC
```

Program VI

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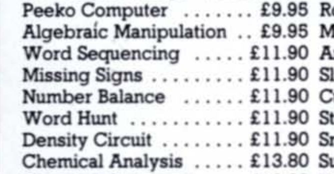

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Wordspell helps with spelling; Tablesums unravels the mysteries of tables; Fairshare uses Ollie the Octopus to make sense of division; Numberfun makes addition and subtraction easy; Wordgames helps with spelling and expands vocabulary; and with Getset a child is helped with counting.

All good fun!

Griffin Software titles are at W H Smith, Boots, and other computer shops everywhere.

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Only £7.99 each to suit the ZX Spectrum 48K   Only £9.95 each to suit the BBC Model B

GRIFFIN SOFTWARE

– it's an education.

Eight socket ROM board.
Smartmouth speech synthesiser
Both from Technomatics

Software only an asterisk away

A ROM extension board gives you the chance to add more than the four possible language or utility ROMs to your BBC Micro. For example, I have Beebcalc, Wordwise, CPN, Basic and the Watford DFS chips.

There are ROMs available with Pascal, Logo, print and disc editing utilities. And I hope more will follow. Certainly the BBC Micro becomes very powerful with so much software only a * command away!

ROM extension boards are not easy to fit. Acorn have not socketed the relevant chips (IC76 and IC20) and one must either desolder the chip and put a socket on the board, or solder leads directly to the chips.

Though able to be done by a competent technician, my advice is that this is a job for your dealer. The BBC board is delicate, the chips close together and mistakes difficult to rectify.

There is another problem. Not all BBCs decode these ROMs in the same way. In theory, the most right hand ROM socket has the highest priority and as you progress towards the 0.1 or 1.2 OS ROM, the priority gets less.

This was certainly not the case on my board. The ROM socket furthest to the right had the highest priority, but after that it was a little strange. Things were made worse when I fitted the ROM extension board.

This is important because different ROMs can take priority over each other and must sit in the right priority socket. For instance, if you have two DFS chips fitted it is the highest priority DFS that handles all default filing and so on.

If, like me, you have the CPN ROM but usually want Basic first, then the priority order must reflect your wishes.

The highest priority is ROM 15. You can detect which ROM socket your machine thinks it is accessing by the following:

Type into the machine:

```
*FX 252,0
Return
Break
```

Then reset the machine with CTRL + Break and change the 0 after the comma to another number from one to 15. Repeat this until you have tracked your ROMs.

When you press Break after the *FX 252 call, the machine "bombs" into the ROM whose number you have specified.

The Technomatics board slots into the most right hand ROM position. It sits just under the keyboard and across the top of the under-board connectors. Thus it can keep as cool as possible.

Other extension boards tend to move into the heart of the micro and can get very hot indeed, which may cause problems later.

The board is well made, adequately insulated from any other electrical components with some of the best quality sockets I have found on a low cost commercial board. This is important if you are continually going to take ROMs in and out of your sockets.

The board has been sitting in my micro for a month now. After the initial pangs of fitting, it has performed well. But along with the Z80 card and other additions, my BBC Micro can get quite hot. This has led to inadequacies in the 6522 chip servicing the keyboard being shown up.

I understand this may be a far more common problem than yet has come to light. After a few hours of operation either the keyboard will not respond or certain keys behave strangely. Like all good bugs it is rare, random and a devil to trace.

If you do fit additional boards then be aware that, though the BBC power supply is more than adequate, some chips on the board are very sensitive to temperature. You may think that your micro is cool – but it isn't!

It will be a difficult choice between the Technomatics and Watford extension boards. On "pence per ROM" Watford wins, but your board is more likely to heat up.

I prefer to play it safer with the Technomatics board. The choice is yours.

Ian Murray

SMARTMOUTH'S NO SWEET TALKER

SMARTMOUTH is an implementation of the allophone technique for speech synthesis.

It produces speech by accessing individual sounds, and words are built up by voicing these in quick succession. It is thus not necessary to know how a word is spelled but how it sounds!

You can then build up the word phonetically using one allophone after another.

Smartmouth comes in a small plastic box with an inbuilt speaker. There is also an audio output for connection to an amplifier if required. It attaches externally to the BBC Micro, power and data being supplied from the micro via the user port. There are two programs on cassette and a six page manual to help you master its working.

The programs consist of a development aid and a demonstration of its use. The manual has a table of the 64 allophones provided, some hints on how to get the best out of the unit, instructions on how to access the unit from a program and a single page of examples. This is very helpful though it would have been useful to have more examples supplied.

The speech from this unit is understandable but not of the same quality as from the Acorn speech ROM. The voice lacks any intonation and really sounds like a computer. It is, however, very easy to produce new words once you get used to what the allophones sounds like.

It is also worth remembering that even a lengthy word such as "synthesiser" can be formed in only 11 bytes so memory overheads are negligible.

Paul Taylor

Make your Micro the life and soul of the party

WITH the festive season once more upon us, here is a little add-on that will make your BBC Micro a welcome guest at any party. As well as being available in kit form, it can also be purchased ready-built for the less intrepid among you.

It is a little-known fact that I used to be a disc jockey in my early youth. The truth of the matter was that I enjoyed wiring up all the amplifiers, turntables and tape decks.

Such was the mess of wiring spaghetti that I was the only one who would dare operate it. It also fell to my lot to wire up the disco lights and to flash them on and off. This was in the Dark Ages when such a thing was a novelty.

However, the control of disco lights was one of the first things I automated. A natural progression was to make the music control the switching of the lights.

When lights are fixed, the results produced do not get very complicated, but the overall effect adds great atmosphere to any party.

I have always had the feeling that something better could be done and for a long time have wanted to do something similar with a computer.

However, not until the advent of the BBC Micro has a computer incorporated sufficient facilities to make this project worthwhile.

This month's exercise is therefore an add-on which produces patterns related to music or, if you have built the solid state relay *(see the September issue of the Micro User)*, controls conventional spot lights.

If you look at music on an oscilloscope you will see a complex ever-changing waveform. In fact it looks a mess. This is because when you use an oscilloscope you are looking at the signal as a plot of amplitude against time, known as a "time domain" view of the signal.

If, however, you take a short section of music (say half a second) and make a plot of the amplitude at each specific pitch you have what is known as a "frequency domain" view of the signal. This can be displayed using an instrument known as a spectrum analyser. (No, it doesn't work out what is wrong with rubber computers!)

The frequency domain view of a signal (or, as we say, its spectrum) shows, at any instant, the composition of the sound in terms of pitch. For most music, this means which instruments were playing at the instant the spectrum was taken.

So all we need for a picture of the sound is to feed our hi-fi into a spectrum analyser. As these cost around £3,000 it is not a very practical proposition.

We can make a crude simulation of a spectrum analyser by filtering the sound so that only a restricted band of frequencies is produced. This can be done with a band-pass filter.

If several band-pass filters are used, all at different frequencies, we can build up an approximation of the spectrum of the sound.

Figure I illustrates the principle: the sound is split up into four frequency-bands and the output of each filter is

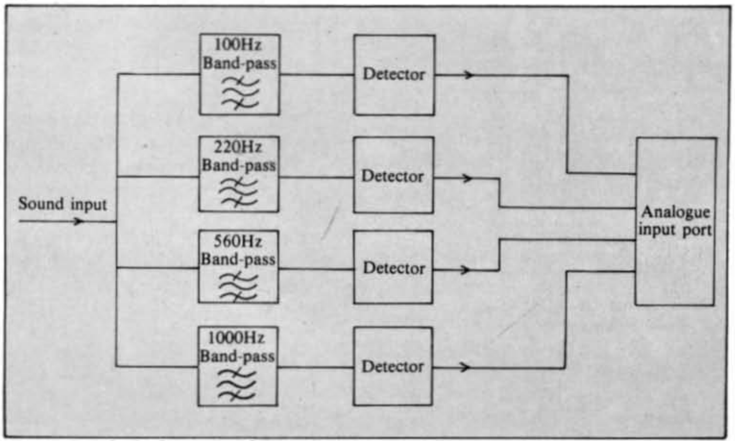

Figure I: Block diagram of our spectrum analyser

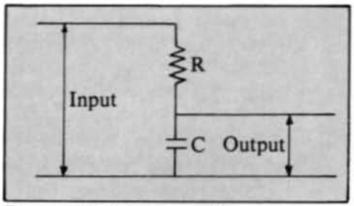

Figure II: A low pass filter

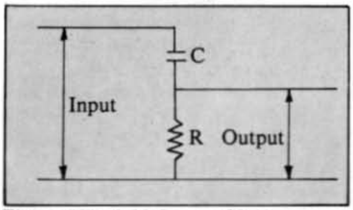

Figure III: A high pass filter

THE BEEB BODY BUILDING COURSE

PART 10

By MIKE COOK

measured in order to build up the spectrum.

In terms of our ultimate goal, the samples can then be used as parameters to create patterns on the computer's display. The problem is to build four filters which will cover the same range of frequencies as the music.

A simple filter can be made with a capacitor and resistor. (See Figure II.) A capacitor does not allow DC to flow through it, only AC. The higher the frequency of this current, the more easily it flows.

In jargon we say the capacitor has a high impedance for low frequencies and a low impedance for high frequencies. Therefore a capacitor can be thought of as a frequency-dependent resistor.

So you will see in Figure II that if the input is a high frequency the output will be small, because the impedance of the capacitor is much smaller than the impedance of the resistor.

Conversely, for a low frequency input, the capacitor has such a high impedance it can be considered effectively removed. So the output will be the same as the input. Because low frequencies are passed through unchanged and high frequencies are attenuated (reduced) this is known as a low-pass filter.

See if you can work out why the circuit in Figure III is a high-pass filter.

By combining a high-pass and a low-pass filter we can produce a band-pass filter. Unfortunately, the circuits in Figures II and III are not usable in practice, due to the impedances of the input and output devices. We have to use amplifiers to reduce the effect of "loading impedances" as they are called.

When an amplifier is included in a filter it is called an active filter (not "Active Fitter" as one Ministry of Defence typist once titled a report of mine).

The simplest way of making an active filter is to use an operational amplifier (or op-amp).

Unfortunately, most op-amps need a split power supply, that is, one with a positive and negative voltage as well as a zero volt rail. This is available from the auxiliary power supply socket of the BBC Micro.

However, if you have a negative supply rail there is a danger that the output of the op-amp will go negative. This in itself is no problem, but if it is connected to the analogue input of the computer it will damage the A/D converter chip.

A better solution is to use an op-amp which does not need a negative supply. These little-known amplifiers work with input currents (as opposed to input voltages as used by the more conventional op-amps). They are known as Norton amplifiers and the symbol is shown in Figure IV.

These current-differencing amplifiers have been designed to work off single-supply voltages over a wide range (4 to 36 volts) and as such are ideal for use with digital electronics.

Like any op-amp they have two inputs. The first is known as the positive input, because any current flowing into it will be amplified and cause the output to rise. The other input is known as the negative or inverting input – when current flows into it, the output falls (goes in a negative direction).

The trick of using op-amps is to arrange the feedback circuit (connecting the output to the input) so that these currents balance out and a stable output is achieved for a stable input. This is not nearly as difficult as it sounds.

Consider Figure V. When no voltage is applied at point P, the output voltage will rise due to the current flowing into the positive input. However, as it rises it makes more current flow into the negative input, which tends to force it down. This reaches equilibrium when the same amount of current is flowing in

→

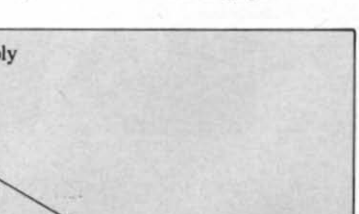

Figure IV: A Norton amplifier

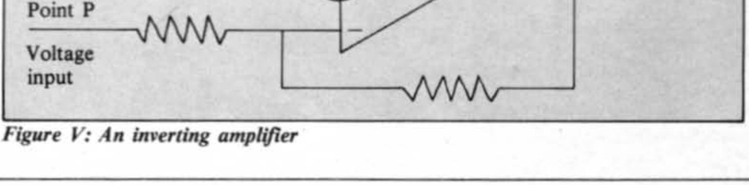

Figure V: An inverting amplifier

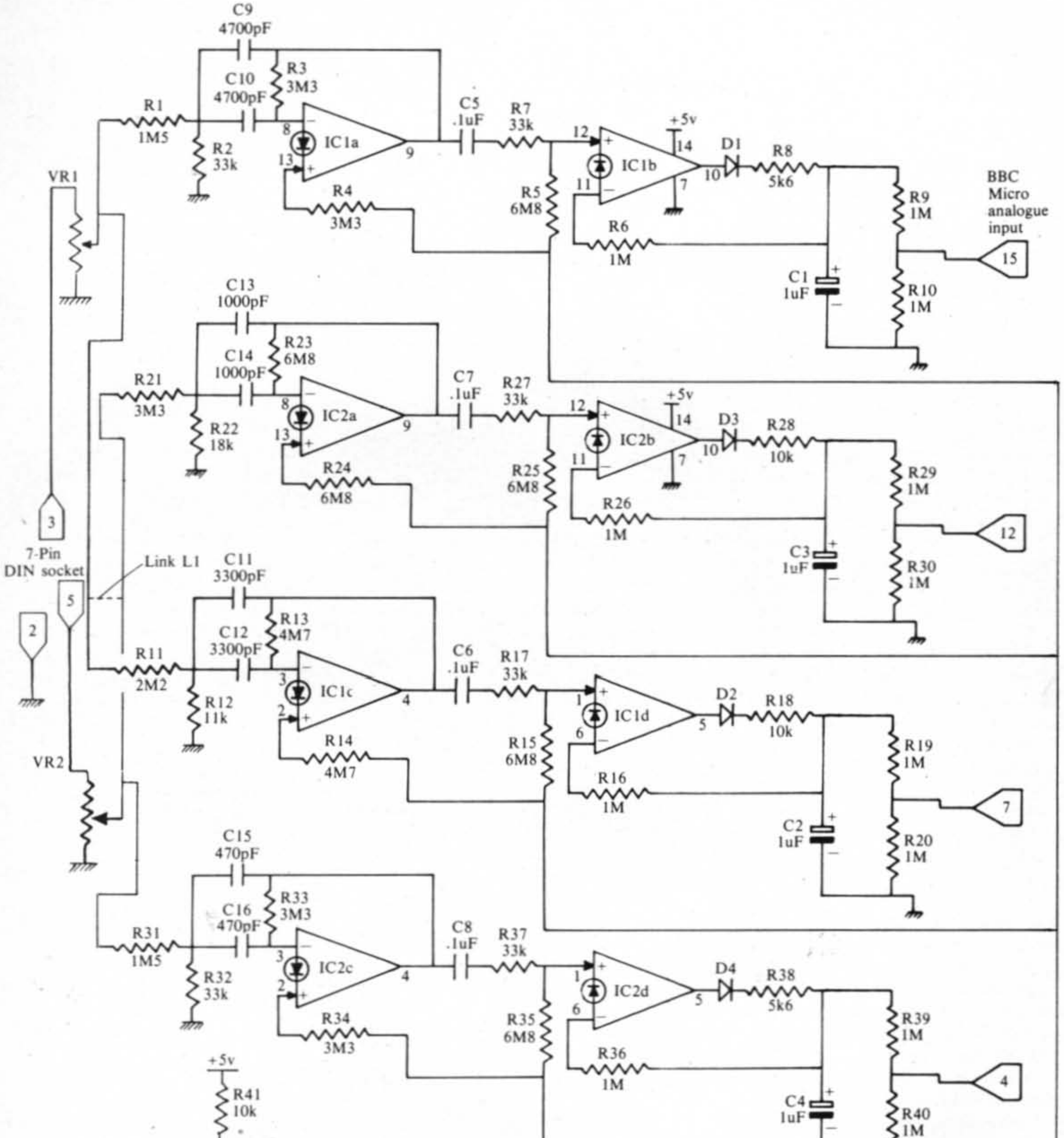
C9
4700pF
R3
3M3
C10
4700pF
R1
1M5
R2
33k
8
13
IC1a
9
R4
3M3
C5
.1uF
R7
33k
12
+5v
14
IC1b
11
7
10
D1
R8
5k6
R5
6M8
R6
1M
R9
1M
BBC
Micro
analogue
input
15
C1
1uF
R10
1M
VR1
C13
1000pF
R23
6M8
C14
1000pF
R21
3M3
R22
18k
IC2a
R24
6M8
C7
.1uF
R27
33k
IC2b
D3
R28
10k
R25
6M8
R26
1M
R29
1M
12
C3
1uF
R30
1M
3
7-Pin
DIN socket
Link L1
5
2
C11
3300pF
R13
4M7
C12
3300pF
R11
2M2
R12
11k
IC1c
4
R14
4M7
C6
.1uF
R17
33k
1
6
IC1d
5
D2
R18
10k
R15
6M8
R16
1M
R19
1M
7
C2
1uF
R20
1M
VR2
C15
470pF
R33
3M3
C16
470pF
R31
1M5
R32
33k
IC2c
R34
3M3
C8
.1uF
R37
33k
IC2d
D4
R38
5k6
R35
6M8
R36
1M
R39
1M
4
C4
1uF
R40
1M
+5v
R41
10k
C17
·1uF
R42
10k
+5v
1
8

Figure VI: The sound-to-pattern converter

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THE BEEB BODY BUILDING COURSE

both inputs of the op-amp.

When the voltage at point P starts to rise, more current flows into the negative input causing the output to fall, thus reducing the amount of feedback current, until again an equilibrium point is reached.

But this time, some of the current in the negative input will come from the signal, and some from the output (feedback). As the output falls when the input signal increases, this configuration is known as an inverting amplifier. You should be able to see that the gain of such an amplifier is controlled by the values of the resistors in the circuit.

If you understood that on the first reading you are doing very well. If not, go back and go through it again and sketch yourself little graphs of the input and output – I find it often helps. The Norton amplifier is available in a chip called the LM3900N. There are four of them, all in the same package.

Now, promise me you won't stop reading this article, and go and have a peep at Figure VI. Pretty impressive hey? Well actually it's not that complicated, because as we need four filters, the basic circuit is just repeated four times. If you can bear it, have a closer look and you will see that the same circuit really is repeated. Only the component values differ.

Body Build Pack No. 8:

C1-C4 1uF Tantalum capacitor, C5-C8, C17 0.1uF paper capacitor, C9 C10 4700 pF polystyrene capacitor, C11 C12 3300 pF polystyrene capacitor, C13 C14 1000 pF polystyrene capacitor, C15 C16 470 pF polystyrene capacitor, D1-D4 1N4148 Diode, IC1 IC2 LM3900N Norton op-amp, VR1 VR2 10 Skeleton preset pot, 7 pin DIN socket, 2 14 pin DIL IC sockets, 15 way D-Type plug, 2 16 mm plastic pillars, 2 self-tapping screws, printed circuit board.

RESISTORS 5%

R1, R31	**1M5**
R2, R7, R27, R17, R32, R37	**33K**
R3, R4, R21, R33, R34	**3M3**
R5, R24, R25, R15, R35, R23	**6M8**
R6, R9, R10, R16, R19, R20, R26	**1M**
R29, R30, R36, R39, R40	**1M**
R8, R38	**5K6**
R28, R18, R41, R42	**10K**
R11	**2M2**
R13, R14	**4M7**
R22	**18K**
R12	**11K**

● ***You can order this, as well as previous Body Build Packs, by using the order form on Page 97.***

Each strip of circuit corresponds to a separate filter/input circuit. The sound signal comes from the input socket. This is a 7-pin DIN socket wired up in exactly the same way as the cassette input socket of the BBC Micro. In this way you can use your cassette recorder to play the music (let's face it, it never was much good for programs!).

If you have a stereo input to this circuit, one channel is controlled by VR1 and the other by VR2. The input socket is wired up to allow this but if you only have a mono system the two halves should be joined together by making link L1.

If you are feeding the unit from the output of a hi-fi amplifier you can wire it up in parallel with the loudspeakers. If you are using stereo, make sure the common lead goes to earth. To be on the safe side, only wire up one speaker wire on one side and two on the other. If both channels do not work you can then safely swap wires until they do.

As the unit has a very high input impedance it will not place any loading on the sound source. A signal of about two volts RMS will be needed to drive the unit, but the sensitivity can be increased by software as we shall see later.

Construction can be done in a number of ways. I made the original prototype on Vero board, with flying leads connecting it to the computer. However, as it is a circuit which quite a lot of people might be interested in, I have produced a printed circuit board. This is available as a kit, with all the components. (See page 97 for ordering details.)

The board uses a 15-way D-type plug and just plugs into the analogue input socket. Two pillars are used at the other end of the board to support it. If you want, however, it may be made in a box to make it look neater, although there is nothing nicer than a well-laid-out circuit.

Construction of the circuit board involves finding the component value from the components list and inserting the appropriate component in the correct place on the printed circuit board. For example, C7 is a 0.1 uF capacitor and should be placed at the component position marked C7 on the printed circuit board.

Note that the resistors only have their number on them, they don't start with 'R'. The diodes need to be placed the right way round. This is shown by the band at one end. Again, match it up with the markings on the printed circuit board.

Apart from the ICs the only other components that need to be the correct way round are the electrolytic capacitors C1 to C4. A small white stripe and a + should be at one end. Put this end to the hole marked + on the board.

The four band-pass filters have their frequencies evenly distributed over the range used for the fundamental notes in most music. The exact frequencies are 100Hz, 220Hz, 560Hz and 1000Hz. Now, hands up all those who think I have made a mistake. Are those frequencies evenly distributed? Well in fact they are, as far as the ear is concerned.

This is because the response of the ear is very nearly logarithmic and so these frequencies sound evenly spaced. If you plot them out on a logarithmic scale you will see there is the same space between them.

Now – hold onto your hats – here is the simple version of how the circuit works. The signal is fed into the input of IC1a through R1 and R2 resistors and the capacitor C10. The feedback is provided by R3 and C9.

As we saw earlier, capacitors act as frequency-dependent resistors, so the amount of signal flowing into the amplifier both from the source and the feedback are frequency-dependent.

At low frequencies, the capacitors can be considered as open circuits. So no signal gets to the imput of the amplifier.

At high frequencies, the capacitors are a very low impedance. So although the signal gets through to the input,

From Page 95

there is lots of negative feedback and the output does not move very much.

Only at some intermediate frequency is there any output. The resistor R4 provides a steady trickle of current, known as the bias current. This bias supply is provided from a potential divider formed by R41 and R42 and is used to prevent the resistor values becoming too high.

Once the signal has been filtered it is passed to the next stage (IC1b) which is known as a peak detector.

Capacitor C5 removes any DC component from the signal and feeds it into the input of the next op-amp. Current is also being supplied from R5 and is acting as the bias for this stage. The output of the op-amp is then passed through a diode.

A diode acts as a one-way valve, allowing current to flow from the output of the op-amp into the capacitor, but not allowing the capacitor to discharge back through the amplifier.

Therefore the diode only conducts when the voltage at the op-amp output is higher than that on the capacitor.

Thus the voltage on the capacitor represents the peak voltage from the amplifier. Resistor R8 controls how fast this peak voltage builds up and R9 and R10 allow this voltage to decay. So the voltage fed into the analogue input socket represents the loudness of the music at that instant. This is known as following the envelope of the music.

All we have to do now is to feed our music signal into this circuit and use the values from the analogue input port to draw our patterns.

As usual I have written a program to illustrate how this is done, which gives very good results. But also, as usual, it is only a starting point for you to experiment with.

The signal being fed into the analogue input port is larger than I required, so it is cut down to size with the variable SCALE%. There is also a DC offset voltage on the input. This is removed by the variable OSET%. These values can be changed to increase the sensitivity of the circuit if the input signal is low.

To test the circuit, you only need to type in lines 10 to 180 (omitting line 150) and lines 950 to 1140.

This displays a bar graph of each input channel so you can make sure that it is moving over a good range. If not, adjust the volume into the filters either from the source, or by adjusting the variable resistors. Alternatively, alter the two variables already mentioned.

The procedure SAMP samples the appropriate input channel and scales the result so that it is between 0 and 40. This value is returned in the variable V%. The procedure BAR then prints a line of stars proportional to the size of the input.

The display looks very much like the rows of flashing lights you get on some modern hi-fi systems.

Having got that working, you can now type in the rest of the program (not forgetting to add line 150). This uses the sound in three ways to produce moving patterns which seem to be evocative of the music being played.

Each different procedure is ended by pressing a key. If this were being used at a party you might like to end each display procedure after a certain time has elapsed – not forgetting to zero the time at the start of each procedure . The lines that need changing are 670, 930 and 1360.

In order to speed up the patterns, use is made of a lookup table, X%(N) and Y%(N), to convert the sound input

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THE BEEB BODY BUILDING COURSE

values to screen co-ordinates. These are pre-calculated in the procedure LOOKUP, along with the initialisation of most constants used in the program. Wherever the program is sensitive to speed I have used integer variables.

The procedure POLYGON uses the value of each sound channel to control the position of each corner of a quadrilateral. This changes shape and distorts in sympathy with the music.

A record of each shape is stored in the array OX% and OY% (old X and old Y) and when there are N% shapes displayed the oldest of them is removed to make way for a new one. This prevents the screen becoming cluttered with remnants of old patterns.

The display responds rapidly to the change in music and is very effective, especially if the music contains a lot of variation and sudden chords.

The second display is more subtle. The pattern woven is much more intricate and changes more gradually. The patterns are very beautiful and seem to follow the mood of the music. This type of display is best suited to contemplative music.

The pattern is formed by marking a point on each axis which corresponds to each channel of the sound. Then every point is joined up to every other point. This is repeated for each quadrant to give a pleasing symmetrical effect. Because the pattern is so complex, only two are displayed at any one time.

The final display is a rapid response display. Each quadrant of the screen is devoted to one channel. A triangle is drawn whose size and displacement from the centre are controlled by the sound-level on each channel.

Again, like the first procedure, the variable N% controls the number displayed at any one time.

In all the above procedures, the colour of the display has been chosen at random, as this seemed to give the most pleasing effect. But you could experiment with the choice of colour being made by the level on one of the channels.

I have found that, for a vigorous display, the patterns should be roughly predictable. I seem to get the greatest enjoyment from this when I can use my knowledge of the music to predict when the patterns will change.

I am more than pleased with the results given by the circuit. It has a very hpynotic effect – you could just stare at it all day. My wife made the point that it helps you listen to the music and gives you a focal point to concentrate on.

School music teachers might find it stops a class getting restless and helps the children pick out individual instruments when listening to music.

Unfortunately I cannot tell you how it fares under actual party conditions for two reasons. Firstly, this is being written before Christmas, so there are not many about, but mainly because I never seem to be asked to any. It might be the soap. I must start using some!

Next month we tell you how to cope with a slipped disc. Merry Christmas!

Full listing on Page 118

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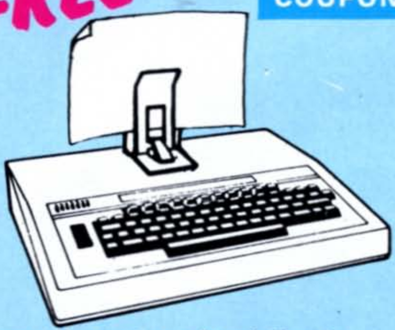

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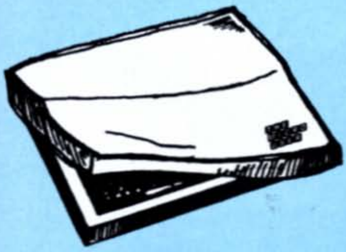

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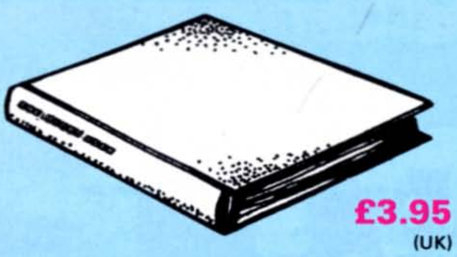

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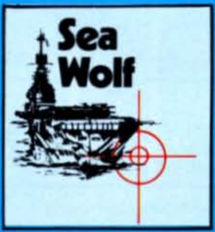

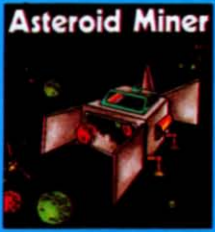

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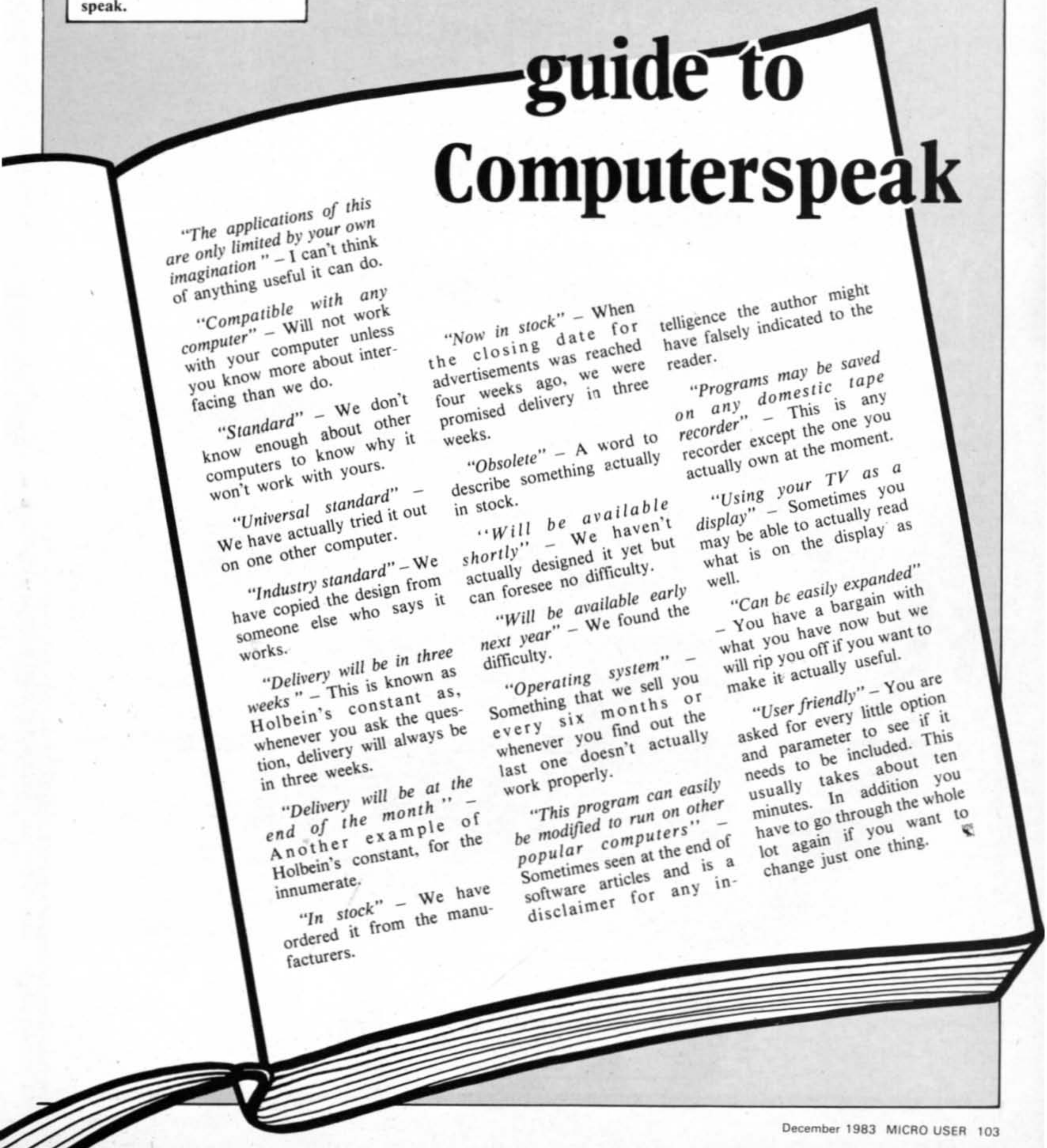
MANY newcomers to microcomputing are somewhat puzzled by the fact that seemingly straightforward words and phrases take on a completely different meaning when used in a computing context. Here is a list, by no means comprehensive, that should allow the computer neophyte to make some sense of the new Computerspeak.

An innocent's guide to Computerspeak



"The applications of this are only limited by your own imagination" – I can't think of anything useful it can do.

"Compatible with any computer" – Will not work with your computer unless you know more about interfacing than we do.

"Standard" – We don't know enough about other computers to know why it won't work with yours.

"Universal standard" – We have actually tried it out on one other computer.

"Industry standard" – We have copied the design from someone else who says it works.

"Delivery will be in three weeks" – This is known as Holbein's constant as, whenever you ask the question, delivery will always be in three weeks.

"Delivery will be at the end of the month" – Another example of Holbein's constant, for the innumerate.

"In stock" – We have ordered it from the manufacturers.

"Now in stock" – When the closing date for advertisements was reached four weeks ago, we were promised delivery in three weeks.

"Obsolete" – A word to describe something actually in stock.

"Will be available shortly" – We haven't actually designed it yet but can foresee no difficulty.

"Will be available early next year" – We found the difficulty.

"Operating system" – Something that we sell you every six months or whenever you find out the last one doesn't actually work properly.

"This program can easily be modified to run on other popular computers" – Sometimes seen at the end of software articles and is a disclaimer for any intelligence the author might have falsely indicated to the reader.

"Programs may be saved on any domestic tape recorder" – This is any recorder except the one you actually own at the moment.

"Using your TV as a display" – Sometimes you may be able to actually read what is on the display as well.

"Can be easily expanded" – You have a bargain with what you have now but we will rip you off if you want to make it actually useful.

"User friendly" – You are asked for every little option and parameter to see if it needs to be included. This usually takes about ten minutes. In addition you have to go through the whole lot again if you want to change just one thing.

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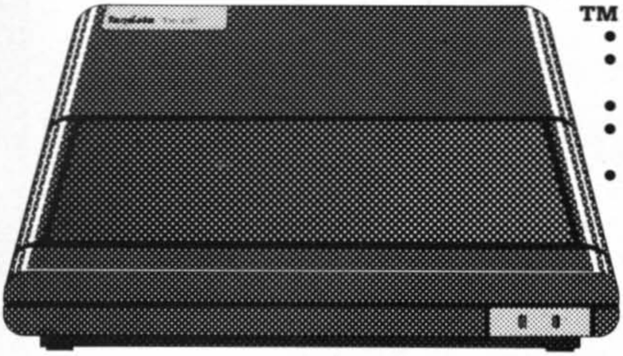

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***OPT6,n**	**Provides control over which part of the file spec. will be displayed ie. only display directory and program length, or just display drive and load address.**
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This DFS also allows for the use of wildcard characters, using either the # symbol for a single wildcard and the * character for multiple wild characters. (e.g. CHAIN "P*" could be used to chain a program called PRINTER as long as there are no other files whose names begin with P).

This DFS is totally compatible with Econet etc., and is complete with a utilities disc and comprehensive manual. The utilities disc contains many useful programmes including printer screen dumps in all modes, including High Res. (Epson & NEC 8023). It also has a nibble editor to scan discs, read data, edit them, and then write back to the disc. Plus a utility to assist in the transfer of cassette files to disc.

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From Page 47

Program VII

```
  10 REM *** PROGRAM VII ***
  20 MODE 1
  30 VDU23;11,0;0;0;0
  40 PROCinit
  50 PROCtriangles
  60 PROCbase
  70 PROCcandles
  80 PROCballs
  90 PROCfairy
 100 PROCmessage
 110 END
 120 REM ============================
 130 DEF PROCinit
 140 VDU 19,3,2,0,0,0
 150 VDU 19,0,4,0,0,0
 160 centre%=640
 170 REPEAT
 180 READ vdu%
 190 IF vdu%<>-1 THEN VDU vdu%
 200 UNTIL vdu%=-1
 210 candle$=CHR$(18)+CHR$(0)+CHR$(1)
+CHR$(224)+CHR$(10) +CHR$(8)+CHR$(225)
+CHR$(8)+CHR$(10)+CHR$(225)+CHR$(18)+C
HR$(0)+CHR$(2)+CHR$(11)+CHR$(11) +CHR$
(8)+CHR$(226)
 220 REM Unfilled ball
 230 uball$=CHR$(227)+CHR$(228)+CHR$(
10)+CHR$(8)+CHR$(8)+CHR$(229)+CHR$(230
)
 240 REM Filled ball
 250 fball$=CHR$(231)+CHR$(232)+CHR$(
10)+CHR$(8)+CHR$(8)+CHR$(233)+CHR$(234
)
 260 REM Fairy
 270 fairy$=CHR$(18)+CHR$(0)+CHR$(1)+
CHR$(235)+CHR$(236)+CHR$(237)+CHR$(10)
+CHR$(8)+CHR$(8)+CHR$(8)+CHR$(238)+CHR
$(239)+CHR$(240)+CHR$(10)+CHR$(8)+CHR$
(8)+CHR$(8)+CHR$(241)+CHR$(242)+CHR$(2
43)
 280 REM Fairy with wings
 290 wfairy$=CHR$(18)+CHR$(0)+CHR$(2)
+CHR$(244)+CHR$(245)+CHR$(246)+CHR$(10
)+CHR$(8)+CHR$(8)+CHR$(8)+CHR$(247)+CH
R$(248)+CHR$(249)+CHR$(10)+CHR$(8)+CHR
$(8)+CHR$(8)+CHR$(250)+CHR$(251)+CHR$(
252)
 300 ENDPROC
 310 REM ============================
 320 DEF PROCtriangles
 330 GCOL0,3
 340 FOR counter%=1 TO 3
 350 READ top%,offset%,bottom%
 360 MOVE centre%,top%:MOVEcentre%-of
fset%,bottom%
 370 PLOT 85,centre%+offset%,bottom%
 380 NEXT counter%
 390 ENDPROC
 400 REM ============================
 410 DEF PROCbase
 420 GCOL0,1
 430 READ offset%,height%
 440 MOVE centre%+offset%,96:MOVE cen
tre%-offset%,96
 450 PLOT 85,centre%+offset%,height%
 460 PLOT 85,centre%-offset%,height%
 470 ENDPROC
 480 REM ============================
 490 DEF PROCcandles
 500 VDU 5
 510 FOR counter%=1 TO 6
 520 READ xpos%,ypos%
 530 MOVE xpos%,ypos%
 540 PRINT candle$
 550 NEXT counter%
 560 VDU4
 570 ENDPROC
 580 REM ============================
 590 DEF PROCballs
 600 VDU 5
 610 FOR counter%=1 TO 6
 620 READ xpos%,ypos%,outer%,inner%
 630 GCOL0,inner%:MOVE xpos%,ypos%
 640 PRINT fball$
 650 GCOL0,outer%:MOVE xpos%,ypos%
 660 PRINT uball$
 670 NEXT
 680 VDU 4
 690 ENDPROC
 700 REM ============================
 710 DEF PROCfairy
 720 MOVE 596,1000
 730 VDU 5
 740 PRINT wfairy$
 750 MOVE 596,1000
 760 PRINT fairy$
 770 VDU 4
 780 ENDPROC
 790 REM ============================
 800 DEF PROCmessage
 810 VDU 5
 820 GCOL0,2
 830 FOR counter%=0 TO 16STEP 4
 840 MOVE 64-counter%,68-counter%
 850 PRINT "MERRY CHRISTMAS AND A HAP
PY NEW YEAR"
 860 NEXT counter%
 870 MOVE 64-counter%,68-counter%
 880 GCOL0,1
 890 PRINT "MERRY CHRISTMAS AND A HAP
PY NEW YEAR"
 900 VDU4
 910 ENDPROC
 920 REM ============================
 930 REM Candle
 940 DATA 23,224,16,56,56,124,124,56,
16,56,23,225,56,56,56,56,56,56,56,56
 950 DATA 23,226,16,56,56,124,124,56,
16,0,23,255,16,56,56,124,124,56,0,0
 960 REM Unfilled Ball
 970 DATA 23,227,1,1,14,56,32,64,128,
128,23,228,128,128,112,28,4,2,1,1,23,2
29,128,128,64,64,32,24,7,0,23,230,1,1,
3,2,4,24,224,0
 980 REM Filled Ball
 990 DATA 23,231,1,1,15,63,63,127,255
,255,23,232,128,128,240,252,252,254,25
5,255,23,233,255,255,127,127,63,31,7,0
,23,234,255,255,255,254,252,248,224,0
 1000 REM Fairy
 1010 DATA 23,235,0,0,0,0,0,0,0,23,2
36,0,0,0,56,124,124,124,56,23,237,0,0,
0,0,0,0,0,0,23,238,0,0,1,3,7,0,0,0,23,
239,124,254,255,125,125,124,254,254
 1020 DATA 23,240,0,0,0,128,192,0,0,0,
23,241,1,1,3,3,7,0,0,0,23,242,255,255,
255,255,255,0,0,0,23,243,0,0,128,128,1
92,0,0,0
 1030 REM Fairy plus Wings
 1040 DATA 23,244,0,32,48,56,60,60,62,
63,23,245,0,0,0,56,124,124,124,57,23,2
46,0,8,24,56,120,120,248,248,23,247,63
,63,63,63,63,63,62,60
 1050 DATA 23,248,255,255,255,255,255,
255,254,126,23,249,248,248,248,248,248
,248,248,120,23,250,61,57,51,35,7,0,0,
0,23,251,255,255,255,255,255,0,0,0,23,
252,120,56,152,136,192,0,0,0
 1060 DATA -1
 1070 REM Triangles Data
 1080 DATA 950,175,775,850,300,550,675
,400,300
 1090 REM Base Data
 1100 DATA 50,296
 1110 REM Candle Positions
 1120 DATA 460,871,805,871,335,646,930
,646,235,396,1030,396
 1130 REM Ball Positions
 1140 DATA 400,400,2,1,800,450,1,2,700
,650,0,1,600,500,1,0,450,625,0,2,575,7
50,2,0
```

Program VIII

```
 10 REM *** PROGRAM VIII ***
 20 MODE1
 30 GCOL0,2
 40 VDU 5
 50 FOR I%=0 TO 12 STEP 4
 60 MOVE 544-I%,512-I%
 70 PRINT "A WORD"
 80 NEXT I%
 90 MOVE 544-I%,512-I%
100 GCOL 0,1
110 PRINT "A WORD"
120 VDU 4
```

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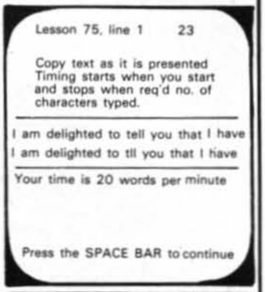

```
Lesson 75, line 1      23

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I am delighted to tell you that I have
I am delighted to tll you that I have
________________________________
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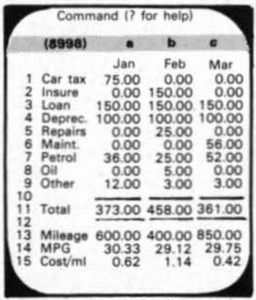
Press the SPACE BAR to continue
```



```
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                 Jan      Feb      Mar
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 3 Loan       150.00   150.00   150.00
 4 Deprec.    100.00   100.00   100.00
 5 Repairs      0.00    25.00     0.00
 6 Maint.       0.00     0.00    56.00
 7 Petrol      36.00    25.00    52.00
 8 Oil          0.00     5.00     0.00
 9 Other       12.00     3.00     3.00
10            ------   ------   ------
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12            ------   ------   ------
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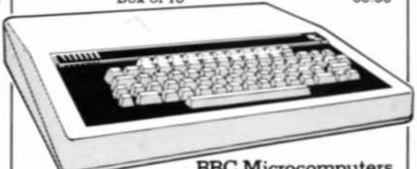

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Quick March listing

From Page 69

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```
 10 REM ******************************
 20 REM * *
 30 REM * VDU23 *
 40 REM * *
 50 REM * Michael Murray 1983 *
 60 REM * *
 70 REM * A program to redefine
     and *
 80 REM * manipulate user defined
     *
 90 REM * characters. *
100 REM * *
110 REM ******************************
120
130 MODE 1
140 VDU 5
150 DIM PARAMETER%(8.7)
160 PROCGRID
170 PROCDRAW
180 PROCCOMMANDS
190 REPEAT
    :PROCCHOICE
    :PROCDRAW
    :PROCCOMMANDS
    :UNTIL FALSE
200 END
210
220 REM ******** GRID **********
230
240 DEF PROCGRID
250 FOR I%=32 TO 992 STEP 40
260 IF I%MOD 320=32 GCOL 0.3
    ELSE GCOL 0.1
270 MOVE 160.I%
    :PLOT 1.960.0
280 NEXT
290 FOR I%=160 TO 1120 STEP 40
300 IF I%MOD 320=160 GCOL 0.3
    ELSE GCOL 0.1
310 MOVE I%.32
    :PLOT 1.0.960
320 MOVE I%+4.32
    :PLOT 1.0.960
330 NEXT
340 VDU 23.224.&FF.&FF.&FF.&FF.&FF
    .&FF,&FF.&FF
350 VDU 23,225.&FF.&C3,&C3,&C3.&C3
    ,&C3.&C3,&FF
360 ENDPROC
370
380 REM ******** DRAW **********
390
400 DEF PROCDRAW
410 GCOL 3,2
420 X%=168
    :Y%=984
430 MOVE X%,Y%
    :PRINT CHR$ (225)
440 REPEAT
450 TIME =0
    :REPEAT UNTIL TIME >10
460 X1%=X%
    :Y1%=Y%
470 IF INKEY (-26) X%=X%-40
480 IF INKEY (-122) X%=X%+40
490 IF INKEY (-58) Y%=Y%+40
500 IF INKEY (-42) Y%=Y%-40
510 IF X%<168 OR X%>1088 X%=X1%
520 IF Y%<64 OR Y%>984 Y%=Y1%
530 MOVE X1%.Y1%
    :PRINT CHR$ (225)
540 MOVE X%.Y%
550 IF INKEY (-90) GCOL 0.0
    :VDU 224.8
    :GCOL 3.2
560 IF INKEY (-106) GCOL 0.2
    :VDU 224,8
    :GCOL 3.2
570 VDU 225
580 UNTIL INKEY (-74)
590 VDU 8,225
600 ENDPROC
610
620 REM ******** COMMANDS **********
630
640 DEF PROCCOMMANDS
650 F%=0
660 FOR R%=704 TO 44 STEP -320
670 FOR C%=168 TO 808 STEP 320
680 FOR P%=280 TO 0 STEP -40
690 BYTE%=0
700 FOR B%=0 TO 280 STEP 40
710 IF POINT(C%+B%.R%+P%)>0 BYTE%=BYT
    E%+2^(7-B%DIV 40)
720 NEXT
730 PARAMETER%(F%.7-P%DIV 40)=BYTE%
740 NEXT
750 F%=F%+1
760 NEXT
    :NEXT
770 FOR F%=0 TO 8
780 VDU 23,224+F%.PARAMETER%(F%
    ,0).PARAMETER%(F%,1).PARAMETER%(F
    %.2).PARAMETER%(F%.3).PARAMETER%(
    F%,4).PARAMETER%(F%,5).PARAMETER%
    (F%.6).PARAMETER%(F%.7)
790 NEXT
800 CLS
    :MOVE 0,1024
    :GCOL 0,3
    :PRINT '"THE COMMANDS ARE:"'
    :GCOL 0,2
810 FOR FIGURE%=0 TO 8
820 PRINT "VDU23.";FIGURE%+224;
830 FOR PARAM%=0 TO 7
840 PRINT ".";PARAMETER%(FIGURE%
    .PARAM%);
850 NEXT
860 GCOL 0.3
    :PRINT " "CHR$ (FIGURE%+224)
    :GCOL 0.2
870 NEXT
880 MOVE 288.208
    :PRINT "Mode1"
    :MOVE 576,208
    :PRINT "Mode2 or 5"
890 MOVE 320.160
900 GCOL 0,3
    :VDU 224,225.226.8,8,8.10.227
    .228.229.8.8.8,10.230,231,232
910 PROCMODE5
920 MOVE 192.32
    :GCOL 0,2
    :PRINT "Press SPACE to continue"
    :REPEAT UNTIL INKEY (-99)
930 ENDPROC
940
950 REM ******** MODE5 **********
960
970 DEF PROCMODE5
980 FOR X%=320 TO 416 STEP 4
990 FOR Y%=64 TO 160 STEP 4
1000 IF POINT(X%.Y%)>0 MOVE X%*2
    .Y%
    :PLOT 1,4.0
1010 NEXT
    :NEXT
1020 ENDPROC
1030
1040 REM ******** RE_DRAW **********
1050
1060 DEF PROCREDRAW
1070 GCOL 0.2
1080 FOR F%=0 TO 8
1090 X%=168+320*(F%MOD 3)
1100 FOR P%=0 TO 7
1110 Y%=984-320*(F%DIV 3)
1120 I%=PARAMETER%(F%.P%)
1130 FOR B%=0 TO 7
1140 IF I%-2^(7-B%)>-1 MOVE X%+40*B%
    .Y%-40*P%
    :VDU 224
    :I%=I%-2^(7-B%)
1150 NEXT
    :NEXT
    :NEXT
1160 ENDPROC
1170
```

→

BBC MICRO USER
Deathwatch
and 24 other programs listed in the pages of BBC Micro User Vol. 1, No. 1.

March Issue

DEATHWATCH, a superb arcade game that challenges you to use your skill to fight off enemy battleships, tanks and helicopters; **BINGO**, illustrating clever uses of the randomise function; **BUBBLESORT** routines; **TESTS** for function keys in machine code routines; a useful **CASSETTE BUGS FIX** for users with OS 0.1 . . and many **COLOUR** and **GRAPHICS ROUTINES** to help you create a kaleidoscope of screen designs which you can incorporate into your own programs.

BBC MICRO USER
KING KONG
and 22 other programs listed in the pages of BBC Micro User Vol. 1, No. 2.

April Issue

KING KONG, a fast moving game in which you pilot a helicopter to rescue girls perched on the Empire State Building before killing Kong; **GRAPHICS**, a suite of colourful demonstration programs; **NIM**, a structural game of strategy; **TOKENS**, first steps in unravelling the Basic ROM; **HOROSCOPES**, a fun program with useful error-trapping routines; **FORMATTER**, an essential disc utility; **DISASSEM**, a full machine code disassembler; **HEAT & LIGHT**, two measuring and plotting programs.

BBC MICRO USER
AIR STRIKE!
32K
and 33 other programs listed in the pages of BBC Micro User Vol. 1, No. 3

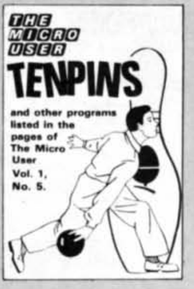
May Issue

AIR STRIKE, a fast and furious arcade game; Test your mental powers with **PELMANISM**; 25 **ANAGRAMS**, an entertaining word game for you to play; **CHARACTER**, to generate vertical and inverted text; **TELETEXT**, animation in Mode 7, really brings the screen to life; **LAB**, a trio of programs to interface laboratory equipment; 10 programs to investigate the **OSBYTE** routine; **BEEB**, two joystick exercises; plus more **COLOUR** and **GRAPHICS** routines.

THE MICRO USER
SPACE PILOT
and other programs listed in the pages of BBC Micro User Vol. 1, No. 4.

June Issue

SPACE PILOT, lost in space with dwindling fuel supplies, you must fight off repeated attacks from alien life forms. To replenish fuel, you have to perform a tricky docking manoeuvre, while to repair the inevitable damage you must land on a mountainous planet. **NOMISM**, you are a nomadic herdsman desperately trying to eke out a living on the plains of Africa. Can you survive drought, tsetse fly and other hazards? **COLOURFUL CHARACTERS PLUS** other listings from the June issue.


THE MICRO USER
TENPINS
and other programs listed in the pages of The Micro User Vol. 1, No. 5.

July Issue

TENPIN, a highly entertaining simulation of Tenpin Bowling; **SPACEPODS**, Try to beat alien hordes; **CUP**, Exciting techniques to bring 3D graphics to the BBC Micro; **SCRSAVE** and **CSRLOAD**, Two programs to allow you to save and load screens to tape or disc; **TEST** and **STEADY**, A pair of programs to accompany the Beeb Body Building Course; **BREAKFIX**, Don't let the Break key destroy all your precious variables! **FORMAT**, Create neater listings with this invaluable utility.

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THE MICRO USER
FRUITIES
and other programs listed in the pages of The Micro User Vol. 1, No. 6

August Issue

FRUITIES, driven by strange urges you climb the ladders of adventure to risk all in the gardens of unearthly frights. Can you survive all the terrors that await you, or will you, too, fall victim to the evil Fruities? A really superb game. **ANIMATION**, a suite of programs that show you how to really bring your screen alive; **CASDISC**, The essential machine code downloader for your disc system; **MODE 7** colour routines to bring yor screen to life. **PLUS** other listings from the August issue.

THE MICRO USER
Robin and Marian
and other programs listed in the pages of The Micro User Vol. 1, No. 7

September Issue

ROBIN & MARIAN, a highly-challenging game in which you play the part of Robin Hood rescuing Maid Marian from the clutches of the Sheriff of Nottingham. **GALACTIC INVADERS**, an extremely well-written cross between two well-known arcade games. **DFS BENCHMARKS**, 14 programs to test out disc filing systems. **ANIMATION**, four programs to teach new techniques. **Terminal**, three programs to connect a BBC Micro to a mainframe. **PLUS** other listings from the September issue.

THE MICRO USER
GONE FISHIN'
and other programs listed in the pages of The Micro User Vol. 1, No. 8

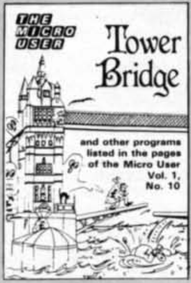
October Issue

FISHING, a compulsive simulation of a day's angling. **JOYKEY**, to convert your programs to joystick control. **PENTEST**, tests the Micro User light pen, and **BELLRINGER**, an amusing and musical way to use it. **CONTOURS**, an educational program with many uses. **LINKs**, two superb pieces of software to let BBC Micros talk to each other. **CHESS**, the winning entry in our June contest. **PLUS** six other programs from the pages of The Micro User, and all the listings from the first issue of Electron User.

THE MICRO USER
Goblins and Blackjack
and other programs listed in the pages of The Micro User Vol. 1, No. 9

November Issue

GOBLINS, a journey through an enchanted forest. **BLACKJACK**, a recreation of the casino favourite. **CHARGE** and **PENDULUM**, two ingenious programs from Body Building Course part 9. **SIDEWAYS**: to store programs in sideways ROMs. **PENDRAW**, a light pen sketching program. **SOUNDs**, seven programs illustrating the excellent sound of the BBC Micro. **TUTORIAL**, listings from part 7 of our beginners' series **PLUS** all the programs from the second issue of Electron User.


THE MICRO USER
Tower Bridge
and other programs listed in the pages of the Micro User Vol. 1, No. 10

December Issue

TOWER, rescue London's treasure from the ghastly ghosts of Tower Bridge. **SANTA**, help Father Christmas deliver his presents despite the striking reindeer! **CARD**, an electronic greetings card from Micro User to you. **VDU 23**, an invaluable character defining utility. **PAGED**, the listing from our paged graphics article. **BODY**, the program accompanying Body Building Part 10 **PLUS** 14 other programs from the pages of The Micro User and all the listings from the third issue of Electron User.

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Quick March listing

From Page 112

```
1180 REM ******** ROTATE RIGHT *******
     ***
1190
1200 DEF PROCROTATE_R
1210 GCOL 0.2
1220 FOR F%=0 TO 8
1230 X%=1088-320*(F%DIV 3)
1240 FOR P%=0 TO 7
1250 Y%=984-320*(F%MOD 3)
1260 I%=PARAMETER%(F%,P%)
1270 FOR B%=0 TO 7
1280 IF I%-2^(7-B%)>-1 MOVE X%-40*P%
     ,Y%-40*B%
     :VDU 224
     :I%=I%-2^(7-B%)
1290 NEXT
     :NEXT
     :NEXT
1300 ENDPROC
1310
1320 REM ******** MIRROR IMAGE *******
     ***
1330
1340 DEF PROCMIRROR
1350 GCOL 0.2
1360 FOR F%=0 TO 8
1370 X%=1088-320*(F%MOD 3)
1380 FOR P%=0 TO 7
1390 Y%=984-320*(F%DIV 3)
1400 I%=PARAMETER%(F%.P%)
1410 FOR B%=0 TO 7
1420 IF I%-2^(7-B%)>-1 MOVE X%-40*B%
     ,Y%-40*P%
     :VDU 224
     :I%=I%-2^(7-B%)
1430 NEXT
     :NEXT
     :NEXT
1440 ENDPROC
1450
1460 REM ******** ROTATE LEFT ********
     **
1470
1480 DEF PROCROTATE_L
1490 GCOL 0.2
1500 FOR F%=0 TO 8
1510 X%=168+320*(F%DIV 3)
1520 FOR P%=0 TO 7
1530 Y%=64+320*(F%MOD 3)
1540 I%=PARAMETER%(F%,P%)
1550 FOR B%=0 TO 7
1560 IF I%-2^(7-B%)>-1 MOVE X%+40*P%
     ,Y%+40*B%
     :VDU 224
     :I%=I%-2^(7-B%)
1570 NEXT
     :NEXT
     :NEXT
1580 ENDPROC
1590
1600 REM ******** CHOICE **********
1610
1620 DEF PROCCHOICE
1630 CLG
     :GCOL 0,3
     :MOVE 0,992
     :PRINT "WHICH OPTION ?"''
1640 GCOL 0,2
     :PRINT "A. Start again."''"B.
      Return to this character set."'
1650 PRINT "C. Rotate right."''"D.
      Rotate left."'
1660 PRINT "E. Mirror image left_right
     ."''"F. Exit the program."
1670 GCOL 0,3
     :PRINT '''"Press A_F"
1680 REPEAT
1690 *FX21,0
1700 G$=GET$
1710 UNTIL G$>"@" AND G$<"G"
1720 IF G$="A" RUN
1730 IF G$="F" END
1740 CLG
     :PROCGRID
1750 IF G$="B" PROCREDRAW
     :ENDPROC
1760 IF G$="C" PROCROTATE_R
     :ENDPROC
1770 IF G$="D" PROCROTATE_L
     :ENDPROC
1780 IF G$="E" PROCMIRROR
     :ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 99.

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Beeb Body Building Course listing

From Page 97

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```
 10 MODE 7
 20 PRINT "Beeb Bodybuilding Course"
 30 PRINT "Sound to Pattern Converter
    "
 40 PRINT "THE MICRO USER"
 50 PRINT "December 1983"
 60 PRINT "By Mike Cook"
 70 PRINT
 80 PRINT "PRESS ANY KEY TO CHANGE
     PATTERN"
 90 *FX16,4
100 SCALE%=1024
110 OSET%=16
120 N%=8
130 DIM X%(40),Y%(40),OX%(N%,4)
    ,OY%(N%,4)
140 DIM SX%(4),SY%(4)
150 PROC_LOOKUP
160 A%=GET
170 MODE 7
180 PROCBAR
190 REPEAT
200 MODE 2
210 VDU 29,640;512;
220 PROC_POLYGON
230 PROC_LINE
240 PROC_TRI
250 UNTIL FALSE
260 END
270 DEF PROC_LOOKUP
280 FOR A=0 TO 40
290 X%(A)=A*16
300 Y%(A)=A*12.8
310 NEXT
320 FOR A=0 TO N%
330 FOR B=1 TO 4
340 OX%(A,B)=0
350 OY%(A,B)=0
360 SX%(B)=1
    :SY%(B)=1
370 NEXT
380 NEXT
390 SX%(2)=-1
    :SX%(3)=-1
400 SY%(3)=-1
    :SY%(4)=-1
410 ENDPROC
420 DEF PROC_LINE
430 CLS
440 VDU 23,1,0;0;0;0;
450 LOCAL A%,B%,C%,NP%
460 NP%=1
470 REPEAT
480 GCOL 3,RND(7)
490 FOR A%=1 TO 4
500 PROC_SAMP(A%)
510 OX%(NP%,A%)=X%(V%)
520 OY%(NP%,A%)=Y%(V%)
530 NEXT
540 FOR A%=1 TO 4
550 FOR B%=1 TO 4
560 FOR C%=1 TO 4
570 MOVE SX%(C%)*OX%(NP%,B%),0
580 DRAW 0,SY%(C%)*OY%(NP%,A%)
590 NEXT
    :NEXT
    :NEXT
600 NP%=NP% EOR 1
610 FOR A%=1 TO 4
620 FOR B%=1 TO 4
630 FOR C%=1 TO 4
640 MOVE SX%(C%)*OX%(NP%,B%),0
650 PLOT 7,0,SY%(C%)*OY%(NP%,A%)
660 NEXT
    :NEXT
    :NEXT
670 UNTIL NOT (INKEY (0))
680 ENDPROC
690 DEF PROC_POLYGON
700 CLS
710 VDU 23,1,0;0;0;0;
720 LOCAL A%,NP%
730 NP%=1
740 REPEAT
750 GCOL 1,RND(7)
760 FOR A%=1 TO 4
770 PROC_SAMP(A%)
780 OX%(NP%,A%)=SX%(A%)*X%(V%)
790 OY%(NP%,A%)=SY%(A%)*Y%(V%)
800 NEXT
810 MOVE OX%(NP%,1),OY%(NP%,1)
820 FOR A%=2 TO 4
830 DRAW OX%(NP%,A%),OY%(NP%,A%)
840 NEXT
850 DRAW OX%(NP%,1),OY%(NP%,1)
 860 NP%=NP%+1
 870 IF NP%>N%
     THEN NP%=1
 880 MOVE OX%(NP%,1),OY%(NP%,1)
 890 FOR A%=2 TO 4
 900 PLOT 7,OX%(NP%,A%),OY%(NP%,A%)
 910 NEXT
 920 PLOT 7,OX%(NP%,1),OY%(NP%,1)
 930 UNTIL NOT (INKEY (0))
 940 ENDPROC
 950 DEF PROCBAR
 960 VDU 23,1,0;0;0;0;
 970 CLS
 980 PRINT "BAR GRAPH OF SOUND"
 990 PRINT
1000 PRINT "SET UP VOLUME LEVELS"
1010 REPEAT
1020 PRINT TAB(0,8)
1030 TIME =0
1040 FOR A=1 TO 4
1050 PROC_SAMP(A)
1060 PRINT STRING$(V%,"*");SPC (40-V%)
1070 NEXT
1080 UNTIL NOT (INKEY (0))
1090 ENDPROC
1100 DEF PROC_SAMP(C%)
1110 V%=ADVAL (C%) DIV SCALE% - OSET%
1120 IF V%<0
     THEN V%=0
1130 IF V%>39
     THEN V%=39
1140 ENDPROC
1150 DEF PROC_TRI
1160 LOCAL NP%,A%
1170 NP%=1
1180 CLS
1190 REPEAT
1200 FOR A%=1 TO 4
1210 MOVE OX%(NP%,A%),OY%(NP%,A%)
1220 PLOT 7,0,OY%(NP%,A%)
1230 PLOT 7,OX%(NP%,A%),0
1240 PLOT 7,OX%(NP%,A%),OY%(NP%,A%)
1250 GCOL 0,RND(7)
1260 PROC_SAMP(A%)
1270 OX%(NP%,A%)=X%(V%)*SX%(A%)
1280 OY%(NP%,A%)=Y%(V%)*SY%(A%)
1290 MOVE OX%(NP%,A%),OY%(NP%,A%)
1300 DRAW 0,OY%(NP%,A%)
1310 DRAW OX%(NP%,A%),0
1320 DRAW OX%(NP%,A%),OY%(NP%,A%)
1330 NEXT
1340 NP%=NP%+1
1350 IF NP%>N%
     THEN NP%=1
1360 UNTIL NOT (INKEY (0))
1370 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 99.

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Christmas card listing

From Page 81

```
    :PLOT 69.X,Y+4
600 PLOT 69,X+1151.Y
    :PLOT 69,X+1143.Y+4
610 NEXT
620 colour1=colour1+1
    :IF colour1=8
    THEN colour1=0
    :colour2=colour2+1
    :IF colour2=8
    THEN colour2=colour1
630 NEXT
640 VDU 5
    :VDU 29.0;0;
    :GCOL 0.6
    :MOVE 160.160
    :PRINT "Merry Christmas
    "
650 VDU 29.635;550;
    :GCOL 0.7
    :PROCcandles
660
670
680 DEF PROCtree(Xcentre
    .Ycentre)
690 VDU 29.Xcentre:Ycentre;
700 black=0
    :red=1
    :green=2
    :yellow=3
    :blue=4
    :white=7
710 PROCtriangle(green
    ,-4,3,0,7,4,3)
720 PROCtriangle(green
    ,-5,0,0,4,5,0)
730 PROCtriangle(green
    ,-6,-3,0,1,6,-3)
740 PROCbox(white,-1,-3
    ,1,-3,-1,-4,1,-4)
750 PROCbox(red,-2.5,-4
    ,-1.5,-6,2.5,-4,1.5
    ,-6)
760 ENDPROC
770
780
790 DEF PROCtriangle(colour
    ,X1,Y1,X2,Y2,X3,Y3)

800 GCOL 0.colour
    :PROCmusic
810 MOVE X1*hsize.Y1*vsize
    :MOVE X2*hsize,Y2*vsize
    :PLOT 85.X3*hsize
    ,Y3*vsize
    :ENDPROC
820
830 DEF PROCbox(colour
    ,X1,Y1,X2,Y2,X3.Y3
    ,X4,Y4)
840 GCOL 0.colour
850 MOVE X1*hsize.Y1*vsize
    :MOVE X2*hsize,Y2*vsize
    :PLOT 85.X3*hsize
    ,Y3*vsize
    :PLOT 85.X4*hsize
    ,Y4*vsize
    :ENDPROC
860
870 DEF PROCballs
    :VDU 5
880 FOR vposn=-3*vsize
     TO 7*vsize STEP vsize/3
890 FOR hposn=-6*hsize
     TO 6*hsize STEP hsize/3
900 IF RND(100)>95
    AND POINT(hposn,vposn)=
    green
    THEN MOVE hposn-24
    ,vposn+16
    :GCOL 0.RND(15)
    :PRINT CHR$ 225
    :GCOL 0,white
    :PLOT 69.hposn+16
    ,vposn+8
910 NEXT
    :PROCmusic
    :NEXT
    :ENDPROC
920
930 DEF PROCcandles
940 PROCpiece(white,0
    ,224)
950 PROCpiece(yellow,1
    ,226)
960 PROCpiece(red,1.227)
970 PROCpiece(yellow,1
    ,228)
980 PROCdelay(20)
990 PROCpiece(yellow,1
    ,226)
1000 PROCpiece(red,1.227)
1010 PROCpiece(yellow,1
    ,228)
1020 GOTO 950
1030 ENDPROC
1040
1050 DEF PROCtrunk(X1,X2
    ,Y1,Y2)
1060 GCOL 0,1
    :MOVE X1*hsize,Y1*vsize
    :MOVE X1*hsize,Y2*vsize
    :PLOT 85,X2*hsize
    ,Y1*vsize
    :PLOT 85,X2*hsize
    ,Y2*vsize
1070 GCOL 0,2
1080 FOR X=X1*hsize
    TO X2*hsize+8 STEP 16
1090 MOVE X,Y1*vsize
    :DRAW X,Y2*vsize+4
1100 NEXT
1110 ENDPROC
1120
1130 DEF PROCpiece(colour
    ,offset,char)
1140 offset=offset*32
1150 GCOL 3,colour
    :MOVE -4*hsize-24
    ,3.5*vsize+offset
    :PRINT CHR$ char
    :MOVE 4*hsize-24,3.5*vs
    ize+offset
    :PRINT CHR$ char
    :MOVE -5*hsize-24
    ,.5*vsize+offset
    :PRINT CHR$ char
1160 MOVE 5*hsize-24,.5*vsiz
    e+offset
    :PRINT CHR$ char
    :MOVE -6*hsize-24
    ,-2.5*vsize+offset
    :PRINT CHR$ char
    :MOVE 6*hsize-24,-2.5*v
    size+offset
    :PRINT CHR$ char
    :ENDPPOC
1170
1180
1190 DEF PROCmusic
1200 IF ADVAL (-6)=0
    THEN ENDPROC
1210 READ note$
    :IF note$="END"
    THEN RESTORE 1270
    :GOTO 1210
1220 IF LEFT$(note$,1)=
    "O"
    THEN octave=VAL (
    RIGHT$(note$,1))
    :GOTO 1210
1230 t=VAL (RIGHT$(note$
    ,1))
    :note$=LEFT$(note$
    ,1)
1240 freq=INSTR(octave$
    ,note$)*4+1+48*(octave-
    2)
1250 SOUND 1,1,freq,t*4
    :GOTO 1200
1260 REM * THE FIRST NOWELL
     *
1270 DATA O3,e1,d1,c3,d1
    ,e1,f1,g4,a1,b1,O4
    ,c2,O3,b2,a2,g4,a1
    ,b1
1280 DATA O4,c2,O3,b2,a2
    ,g2,a2,b2,O4,c2,O3
    ,g2,f2,e4,e1,d1,c3
    ,d1,e1,f1
1290 DATA g4,a1,b1,O4,c2
    ,O3,b2,a2,g4,a1,b1
    ,O4,c2,O3,b2,a2,g2
    ,a2,b2
1300 DATA O4,c2,O3,g2,f2
    ,e4,e1,d1,c3,d1,e1
    ,f1,g4,O4,c1,O3,b1
    ,a4,a2,g6,O4,c2,O3
1310 DATA b2,a2,g2,a2,b2
    ,O4,c2,O3,g2,f2,e8
1320 REM *O COME ALL YE
     FAITHFUL *
1330 DATA g2,g4,d2,g2,a4
    ,d4,b2,a2,b2,O4,c2
    ,O3,b4,a2,g2
1340 DATA g4,F#2,e2,F#2
    ,g2,a2,b2,F#4,e3,d1
    ,d8,O4,d4,c2,O3,b2
    ,O4,c4,O3,b4
1350 DATA a2,b2,g2,a2,F#3
    ,e1,d2,g2,g2,F#2,g2
    ,a2,g4,d2,b2,b2
1360 DATA a2,b2,O4,c2,O3
    ,b4,a2,b2,O4,c2,O3
    ,b2,a2,g2,F#4,g2,O4
    ,c2,O3,b4,a3,g1,g8
1370 REM *WHILE SHEPHERDS
     WATCH*
1380 DATA f2,a3,a1,g2,f2
    ,A#2,A#2,a2,g2,a2
    ,O4,c2,c2,O3,b2,O4
    ,c6,O3,a2,O4,d3,c1
1390 DATA O3,A#2,a2,g2
    ,f2,e2,a2,g2,f2,f2
    ,e2,f8
1400 REM *SILENT NIGHT*
1410 DATA g3,a1,g2,e6,g3
    ,a1,g2,e6,O4,d4,d2
    ,O3,b6,O4,c4,c2,O3
    ,g6,a4,a2,O4,c3,O3
1420 DATA b1,a2,g3,a1,g2
    ,e6,a4,a2,O4,c3,O3
    ,b1,a2,g3,a1,g2,e6
    ,O4,d4,d2,f3,d1,O3
1430 DATA b2,O4,c6,e6,c2
    ,O3,g2,e2,g3,f1,d2
    ,c9
1440 DATA END
1450 DEF PROCdelay(t)
    :T=TIME +t
    :REPEAT PROCmusic
1460 UNTIL TIME >T
    :ENDPROC
1470 END
```

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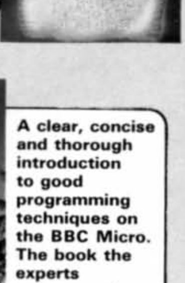
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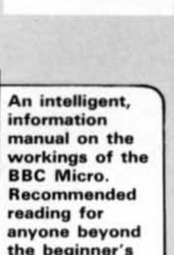
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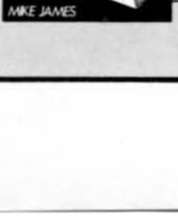
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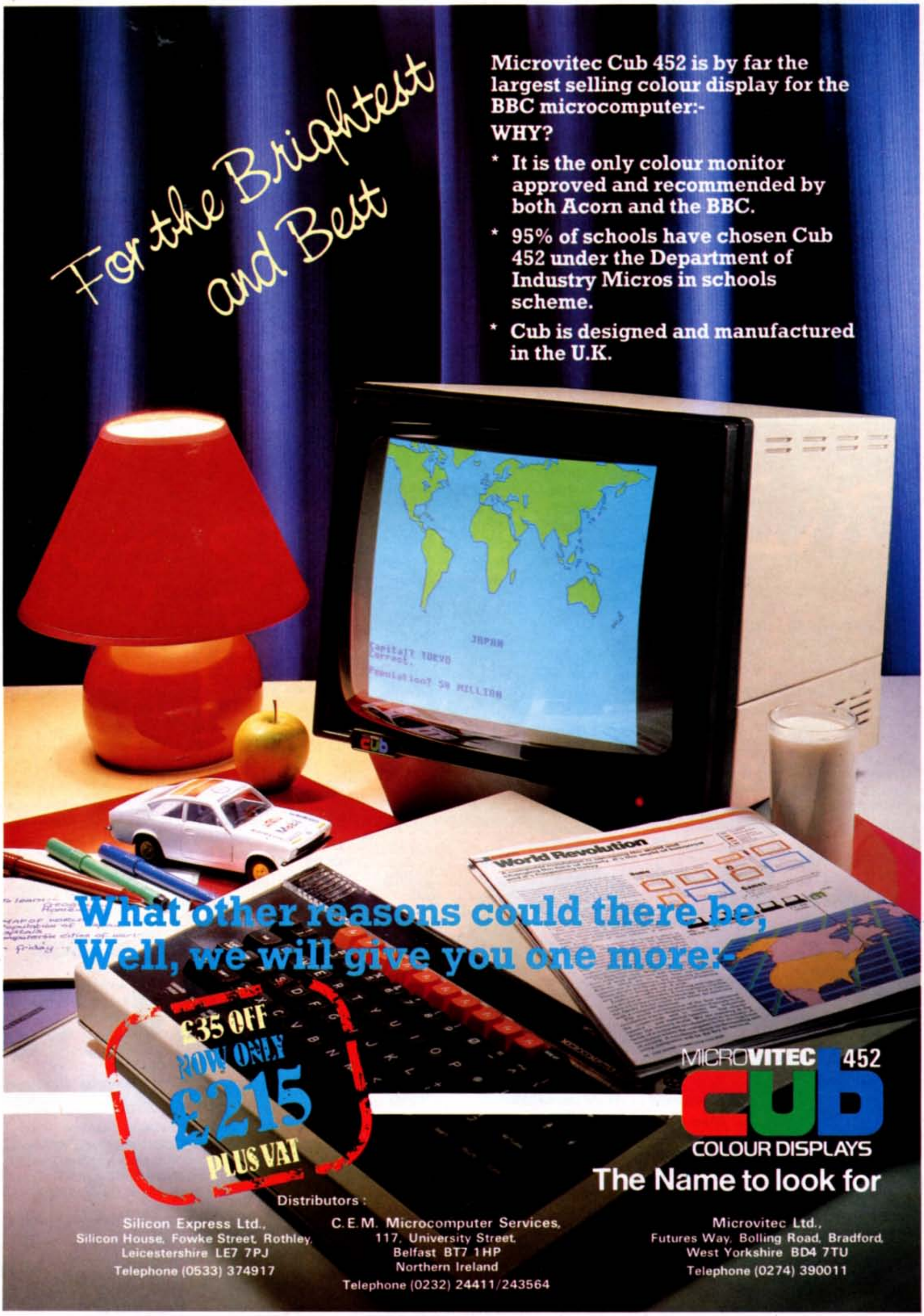
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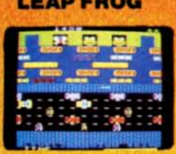

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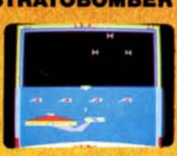

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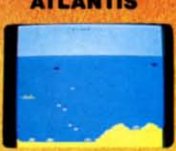

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Tower Bridge listing

From Page 55

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```
 10 REM ********************
    *********
 20 REM * TOWER BRIDGE
     GAME *
 30 REM * *
 40 REM * Designed by
     *
 50 REM * *
 60 REM * P. BIBBY *
 70 REM * *
 80 REM * Program by *
 90 REM * *
100 REM * ZEN *
110 REM * *
120 REM * (c) 1983 *
130 REM * THE MICRO USER
     *
140 REM * *
150 REM ********************
    *********
160 PROCinit
170 ON ERROR PROCerr
180 REPEAT
190 MODE 7
200 PROCinstruct
210 M%=3
    :S%=0
    :no%=1
220 REPEAT
230 MODE 1
240 VDU 23,0,8202;0;0;0;
250 PROCsetup
260 PROCscreen
270 PROCbridge
280 VDU 5
290 PROCman
300 FOR N%=0TO 2
    :PROCguard
    :NEXT
310 REPEAT
320 *FX15.1
330 IF POINT(X%+20,Y%-36)=0
    AND (X%<>352OR X%<>864)
    PROCfall(16,0)
340 IF POINT(X%+16,Y%-46)=1
    SOUND &11,2,20,255
    :PROCfall(3,1)
    :A%=1
350 IF POINT(X%+16,Y%-4)=1
     AND C%=1SOUND &12
    ,2,120,255
    :C%=0
    :D%=D%+1
    :VDU 4
    :PRINT TAB(30,1)" "
    :VDU 5
360 K%=INKEY (0)
    :IF K%<>-1PROCmanmove
370 IF TIME MOD 800<10up%=1
380 IF up%PROCraise(8)
390 IF U%>1AND up%=0
    PROCraise(-8)
400 PROCthink
410 UNTIL T%=11 OR A%
420 IF A% PROCdead
    :
    ELSE no%=no%+1
430 IF no%>=6 no%=6
440 UNTIL M%=0
450 IF S%>=hi% hi%=S%
460 UNTIL 0
470 END
480 DEF PROCdead
490 LOCAL N%
    :FOR N%=0TO 90
    :VDU 19,3,RND(15);0;
    :SOUND &11,2,1,255
    :SOUND &12,2,50,255
    :SOUND &13,2,90,255
    :NEXT
    :VDU 19,3,3;0;
    :M%=M%-1
500 ENDPROC
510 DEF PROCmanmove
520 IF K%=46X%=X%+32
    :Z%=3
    :nc%=nc%+1
    :IF nc%>Z% nc%=Z%-1
530 IF K%=44X%=X%-32
    :Z%=5
    :nc%=nc%+1
    :IF nc%>Z% nc%=Z%-1
540 IF K%=65AND POINT(X%
    ,Y%-4)=1Y%=Y%+32
    :nc%=6
550 IF K%=90AND POINT(X%
    ,Y%-4)=1Y%=Y%-32
    :nc%=6
560 IF X%<=0X%=0
    ELSE IF X%>=1248X%=1248
570 IF Y%<323Y%=323
    ELSE IF Y%>867Y%=867
580 IF POINT(X%+4,Y%+16)=2
    AND C%=0SOUND &13
    ,2,20,255
    :C%=1
    :MOVE X%,Y%+28
    :GCOL 3,3
    :VDU 96
    :VDU 4
    :PRINT TAB(30,1)"£"
    :VDU 5
590 IF X%=32AND Y%=323
    AND C%=1SOUND &13
    ,2,60,255
    :C%=0
    :VDU 4
    :S%=S%+10
    :PRINT TAB(30,1)" "
    TAB(T%,25)"£"TAB(14
    ,1);S%
    :VDU 5
    :T%=T%+1
600 SOUND &11,-10,120
    ,1
610 PROCman
620 ENDPROC
630 DEF PROCfall(V%,W%)
640 SOUND &11,1,220,200
    :nc%=6
    :REPEAT
    :Y%=Y%-V%
    :PROCman
    :UNTIL POINT(X%+16
    ,Y%-36)<>W%
    :SOUND &10,-15,6,1
    :SOUND &11,0,0,0
650 DEF PROCman
660 GCOL 3,2
    :MOVE X%,Y%
    :VDU 224+nc%
670 MOVE lx%,ly%
    :VDU 224+oc%
680 oc%=nc%
    :lx%=X%
    :ly%=Y%
690 ENDPROC
700 DEF PROCthink
710 N%=(N%+1)MOD no%
720 ON N%+1 GOSUB 820
    ,840 ,830 ,830 ,850
    ,840
730 PROCguard
740 ENDPROC
750 DEF PROCguard
760 GCOL 3,3
770 MOVE X%(N%),Y%(N%)
    :VDU 233
780 MOVE OX%(N%),OY%(N%)
    :VDU 233
790 OX%(N%)=X%(N%)
    :OY%=Y%(N%)
800 IF POINT(X%(N%)+4
    ,Y%(N%)+16)=1AND D%>0
    SOUND &13,2,20,255
    :D%=D%-1
    :MOVE X%(N%),Y%(N%)+28
    :GCOL 3,3
    :VDU 96
810 ENDPROC
820 X%(N%)=X%(N%)+32
    :IF X%(N%)>1248X%(N%)=8
    64
    :RETURN
    :
    ELSE RETURN
830 X%(N%)=X%(N%)-32
    :IF X%(N%)<416X%(N%)=83
    2
    :RETURN
    :
    ELSE RETURN
840 X%(N%)=X%(N%)-32
    :IF X%(N%)<0X%(N%)=320
    :RETURN
    :
    ELSE RETURN
850 X%(N%)=X%(N%)+32
    :IF X%(N%)>1248X%(N%)=9
    28
    :RETURN
    :
    ELSE RETURN
860 DEF PROCraise(R%)
870 IF U%>90AND R%=8up%=0
    :ENDPROC
880 PROCbridge
    :U%=U%+R%
    :PROCbridge
890 ENDPROC
900 DEF PROCbridge
910 GCOL 3,3
920 MOVE 416,444
    :DRAW 639-U%,444+U%
    :DRAW 639-U%,476+U%
    :DRAW 416,476
    :MOVE 832,444
```

→

BBC FORTH £15

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LEVEL 9 COMPUTING

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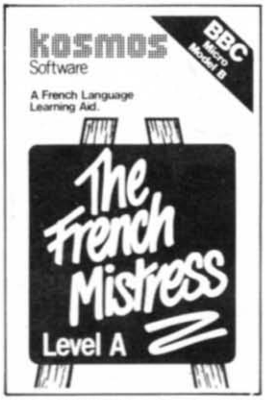

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Tower Bridge listing

From Page 127

```
    :DRAW 640+U%,444+U%
    :DRAW 640+U%,476+U%
    :DRAW 832,476
 930 ENDPROC
 940 DEF PROCscreen
 950 VDU 19,1,4;0;19,2
    ,2;0;19,3,3;0;
 960 COLOUR 130
    :VDU 28,0,31,39,29
    ,12
    :COLOUR 129
    :VDU 28,0,2,39,0,12
    ,26
 970 COLOUR 128
    :PRINT TAB(8,1)"Score:"
    ;S%TAB(24,1)"Cargo:
     "TAB(16,30)"Level:";no%
 980 PROCtower(10,4)
 990 ENDPROC
1000 DEF PROCtower(A%,B%)
1010 LOCAL X%,Y%
1020 COLOUR 129
    :VDU 28,13,25,25,23
    ,12
    :COLOUR 130
    :VDU 28,0,25,12,23
    ,12,28,26,25,39,23
    ,12,26
1030 COLOUR 128
1040 FOR X%=0TO 2
    :FOR Y%=0TO 18
1050 PRINT TAB(X%+A%,Y%+B%)
    CHR$ (224);TAB(X%+16+A%
    ,Y%+B%)CHR$ (224)
1060 NEXT Y%
    :NEXT X%
1070 COLOUR 1
    :FOR X%=9TO 29
    :PRINT TAB(X%,6)
    CHR$ (232)
    :NEXT
1080 COLOUR 131
    :VDU 28,0,17,12,17
    ,12,28,27,17,39,17
    ,12,26
    :COLOUR 128
1090 FOR Y%=4TO 22
    :PRINT TAB(11,Y%)
    CHR$ (225);TAB(27
    ,Y%)CHR$ (225)
    :NEXT
1100 VDU 4
    :COLOUR 129
    :COLOUR 2
    :PRINT TAB(1,15)"£"
    TAB(38,21)"£"TAB(38
    ,15)"£"TAB(14,4 )"£"
    TAB(24,4)"£"TAB(14
    ,15)"£"TAB(8,15)"£"
    TAB(30,15)"£"TAB(24
    ,15)"£"TAB(30,21)"£"
    TAB(8,21)"£"TAB(0
    ,20)"Bank"
1110 COLOUR 3
    :PRINT TAB(0,1)
    STRING$(M%,CHR$ (226))
    :COLOUR 128
1120 ENDPROC
1130 DEF PROChead
1140 FOR n%=0TO 1
    :PRINT TAB(10,0+n%)
    CHR$ (157)CHR$ (132)
    CHR$ (141)"Tower Bridge
       "CHR$ (156)
    :NEXT
1150 PRINT TAB(14,3)
    CHR$ (130)CHR$ (136)
    "by ZEN"TAB(16,5)"HI:";
    hi%
1160 ENDPROC
1170 DEF PROCinstruct
1180 PROChead
1190 PRINT TAB(14,10)
    CHR$ (131)"A  =  Up"
    TAB(14,13)CHR$ (131)
    "Z  =  Down"TAB(14
    ,16)CHR$ (131)"<  =
      Left"TAB(14,19)
    CHR$ (131)">  =  Right"
1200 PRINT TAB(0,24)"<RETURN
    > for INSTRUCTIONS
     <SPC> to PLAY";
1210 *FX15,1
1220 REPEAT G=GET
    :UNTIL G=32 OR G=13
1230 IF G=13 PROCtell
1240 ENDPROC
1250 DEF PROCtell
1260 CLS
    :PROChead
    :PRINT '"As custodian
     of the Tower of London
     you"'"are rather supri
    sed one night when
     the"'"treasures vanish
      They were taken by
     the Tower  ghosts.
     Your job is to get"'
    "them all back to the";

1270 PRINT " bank. To collec
    t a treasure all you
     have to do is run
     underthe ""£"" signs.
     The treasure will
     then beadded to the
     cargo display. By
     running"'"into the
     bank you can deposit
     your loot.";
1280 PRINT "The ghosts canno
    t kill you but if they"
    '"catch you while you
     are carrying a"'"treas
    ure the will almost
     certainly "'"steal
     it back and stash
     it somewhere"'"else.
     Each time you complete
     a wave the next one
     have more ghosts."
1290 PRINT "Watch out for
     the BRIDGE and the
     THAMES";
1300 PRINT TAB(10,24)"Press
     <SPC> to PLAY";
1310 *FX15,1
1320 REPEAT UNTIL 32=
    GET
    :ENDPROC
1330 DEF PROCinit
1340 DIM X%(5),Y%(5),OX%(5)
    ,OY%(5)
    :hi%=300
1350 *FX12,1
1360 *FX11,1
1370 ENVELOPE 1,0,-2,0
    ,0,200,0,0,127,0,0
    ,0,126,0
1380 ENVELOPE 2,0,-230
    ,230,-230,5,5,5,127
    ,-1,0,0,126,0
1390 VDU 23,224,&B6,&B6
    ,0,&5B,&5B,0,&B6,&B6
1400 VDU 23,225,&FF,&81
    ,&81,&81,&FF,&81,&81
    ,&81
1410 VDU 23,226,24,24,16
    ,254,16,28,116,70
1420 VDU 23,227,24,24,16
    ,254,16,208,112,24
1430 VDU 23,228,24,24,8
    ,127,8,11,14,24
1440 VDU 23,229,24,24,8
    ,127,8,56,46,98
1450 VDU 23,230,90,90,126
    ,24,24,126,66,66
1460 VDU 23,231,0,0,0,255
    ,255,126,126,60
1470 VDU 23,232,255,129
    ,131,133,137,145,161
    ,255
1480 VDU 23,233,24,60,90
    ,255,219,66,126,36
1490 ENDPROC
1500 DEF PROCsetup
1510 lx%=-32
    :ly%=-32
    :X%=32
    :Y%=323
    :oc%=3
    :nc%=3
    :Z%=3
    :U%=1
    :A%=0
    :C%=0
    :D%=0
    :up%=0
1520 X%(0)=1280
    :X%(1)=-32
    :X%(2)=1280
    :Y%(0)=323
    :Y%(1)=515
    :Y%(2)=867
1530 X%(3)=1280
    :X%(4)=-32
    :X%(5)=-32
    :Y%(3)=515
    :Y%(4)=515
    :Y%(5)=323
    :T%=0
1540 FOR N%=0TO 5
    :OX%(N%)=X%(N%)
    :OY%(N%)=Y%(N%)
    :NEXT
1550 ENDPROC
1560 DEF PROCerr
    :IF ERR =17ENDPROC
1570 *FX12,0
1580 *FX12,3
1590 VDU 4
    :REPORT
    :PRINT " In line "ERL
1600 END
```

This listing is included in this month's cassette tape offer. See order form on Page 99.

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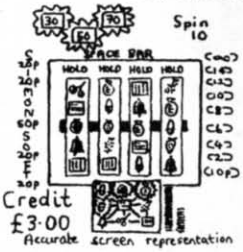

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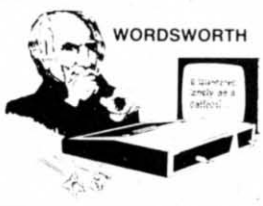

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No plaudits for handwriting . . .

THREE cheers for Christopher Hester, who in October's Micromail exposed the naked king of over-precious structured programming!

What in the world is so sacrosanct about a PROC? Why the lumbering PROC . . . DEFPROC . . . ENDPROC when a plain honest GOSUB . . . RETURN does the job in half the time, is easily traceable and is just as readily debuggable?

Your program structure shouldn't suffer a whit by a GOSUB: GOSUBs are quick and nimble, whereas PROCs are heavy, fat and sanctimonious.

The only advantage in using PROCs lies in their control variable facility, and if you don't want a control variable (as most people don't) then why leave the nippy GOSUB languishing, discredited, in the wings?

And while we're on the subject, why all this pious claptrap about using TRUE and FALSE, when a simple 1 or 0 flag is far more easy to use?

Or at least it would be if the Acorn compilers were not so waywardly silly as to insist on a –1 value for TRUE, thus denying us the quick and easy IF x . . . and IF NOT x . . . clauses.

These poor brainwashed Beeb programmers have been misled into considering it a point of honour not to include a single GOTO or GOSUB in their listings.

What a pathetically self-righteous and hypocritical attitude! We are interested in what programs DO, not in delivering pats on the head for the handwriting. – **David Bye, Saffron Walden, Essex.**

Squaring things up

I HAVE bought your magazine since it first appeared, and have found it very helpful.

So perhaps I can help some of your readers with the problem of "NO ROOM" in the King Kong and Deathwatch programs. I also fell into the trap of creating unwanted spaces that took up memory. I then obtained the following short program that will list all extra spaces including the essential ones.

First list your program to screen and then type the following:

```
MODE6:VDU19,0,1,0,0,0:VDU23,
32,255,255,255,255,255,255,2
55,255
```

Then press Return. The listing starting at the beginning will now appear with squares making the spaces and all unwanted ones can be removed by the aid of the copy key.

You will be amazed at the number of spaces that creep in and are not required. – **S.H. Gereham, Romford.**

Lost programs

I HAVE several enquiries which I hope you may be able to answer. They are all intriguing and could well be of interest to other readers.

The first problem arose when I bought for my school a piece of software which I spent the whole weekend trying to list. It loaded all right and then ran. (I typed LOAD, etc rather than CHAIN.)

When I typed LIST, the screen went blank. I used an assembly language retrieval program – nothing.

I tried to list only certain sections – nothing. I tried to delete certain lines – nothing. Eventually the program was lost and I reloaded it.

After abortive attempts to list, anything I pressed gave "Bad Program". What intrigues me is how they do it? I want to learn rather than infringe copyright!

Secondly, I have heard that transferring programs from cassette to disc can be awkward. I should think that for long programs, needing to be loaded at &E00, it would prove rather difficult. So how is it done?

Thirdly, I read often that certain memory locations contain certain information. How can I find out what's where?

For example, in the November issue, one of your correspondents writes that information on which mode one is in is contained in location &367. How can you find out these things?

Lastly, could you explain what VDU23 does – apart from turning the cursor on and off and re-programming display characters.

Then again, what about VDU23,9;16;0;0; or whatever?

Could we have a comprehensive list of all possible VDU23 commands?

Oh yes – what about an article on GCOL1, 2 & 3!

Needless to say, an excellent magazine. – **Graham Conridge, London.**

● The software protection method you describe is caused by entering control codes into REM statements. For obvious reasons we cannot give more details.

The problems of transferring cassette to disc were fully covered in Peter Walker's article in the August issue of *Micro User*.

I suggest the Advanced User Guide and our back issues as sources of information on memory locations, and also on VDU23.

This command can be used in two ways to create user defined characters, or to directly program the 6845 – details of which we shall be giving in forthcoming articles.

We're also going to feature soon the uses of GCOL 1, 2 and 3.

rqForth

I WAS delighted to find Chris Martin's lengthy review of Level 9's rqForth in your November issue and was glad that he seems to like it (once I'd tracked down his opinions among the inevitable paragraphs on Forth history, etc!).

Readers may be interested to learn that all copies of rqForth sold since Easter have included versions for both cassette and disc (with a free 30 page disc supplement in addition to the normal manual). – **Pete Austin, High Wycombe.**

Skeleton unearthed

AFTER reading about Acorn's most generous advice to its rival software houses about indirectly addressing the screen and how this programming activity will lead to incompatibility with the second processor (if it ever arrives, that is), I was wondering how Acornsoft managed to obtain the speed required for their Super Invaders.

After many long nights bent

→

MICROMAIL

From Page 131

over a hot (well, warm at least) computer typing my fingers to the bone using the brilliant (so Acorn would have us believe) OS calls in my programs, I still could not get the speed I required for my Invaders game.

Finally, in desperation an evil thought crossed my mind, "Why not address the screen directly?"

Quickly I shook the abhorrent thought from my ungrateful head and decided to find out how the experts used the OS calls to such magnificent effect.

After much hair pulling and late nights while examining the innermost secrets of Super Invaders, I finally discovered Acornsoft's skeleton in the cupboard (or should it be bug in the OS) – they address the screen directly!

So it appears that after all Acorn's ranting about unprofessional programming practices, they forgot to send an internal memo to their own subsidiary company, Acornsoft, about the perils of direct screen addressing.

Or is there a way of direct screen addressing and still making it compatible with the second processor which friendly old Acorn forgot to tell us about?

It will be interesting to find out if this programming practice is possible and if not I hope Acorn will be as quick in reprimanding Acornsoft as it has been in the past in attacking magazines which try to help their readers to become more experienced programmers. – **David Young, Michael Young, Derby.**

Applesoft Forth tips

NEWCOMERS like myself to Acornsoft Forth might find the following tips useful.

After loading the system, including the editor and assembler, type in `9 KEY'` *(Return) as this will clear the f9 key and avoid carrying out a COLD restart by accident.*

`7 KEY' V7 M (Return)` *will define f7 to give mode 7 and the OK prompt and avoids any risk of a basic program line 7 being entered as could happen if the key was defined in the obvious way, using 7 MODE.*

HERE FENCE! (Return) avoids FORGETting any words by mistake.

It is possible to use a screen dump from within Forth by doing the following:

*Press BREAK and *load the dump code in memory so as not to conflict with the Forth system (in my case at &900).*

Define SCREEN-DUMP as follows:

```
HEX
CODE SCREEN-DUMP
XSAVE STX,
xxx JSR,
XSAVE LDX,
NEXT JMP,
END-CODE
DECIMAL
```

(xxx is execution address of dump routine)

Typing SCREEN-DUMP (Return) will then call the dump routine. You can define a function key to call the screen-dump transparently by entering

```
x KEY' ¦\¦@¦@¦@¦@¦X¦@¦@¦@¦@¦@
¦@¦@¦@¦E SCREEN-DUMP ¦M¦Z¦D
```

which sets up text and graphics windows of zero co-ordinates, joins text and graphics cursors, calls the screen dump without SCREEN-DUMP appearing on the screen and then restores the cursor and windows to default values.

Repeated copies of the screen can be made, all identical and unblemished.

I hope these tips save other novices the hours of confusion that I went through. – **Paul F. Tolson, Dewsbury, Yorkshire.**

Suppressing display

WITH reference to the problem of suppressing the screen display during output to the printer, as discussed on page 58 of the October Micro User, unfortunately the solution suggested does not always work as expected, particularly if printing graphics as well as text.

I have found that a program which previously worked perfectly gave a very strange printout.

*The solution I have adopted avoids any interference with the VDU drivers or channel *FX calls, and a listing is enclosed.*

As you can see I have simply defined a zero text window after printing a message on the screen, and also switched off the cursor. All that is seen of the printing is an occasional slight flicker in the top left hand corner of the screen.

To use the procedures,

IF you're a Prestell subscriber you can now write to Micromail by Electronic Mail. Our Mailbox number is 614568383. These were the first messages we received:

HELLO, nice to see you published my letter and also your Mailbox number for all to see. This is coming to you via the offline Mailbox editor.

While I'm on I have a couple of questions for you. Is the light pen article in your November issue complete?

I'm asking because I can't get it to work with my homemade light pen. I have other programs, so I know it works.

The pallet appears but the pen doesn't respond. – **James T.A. Wilkins.**

● The light pen you mentioned doesn't have the special circuit which is incorporated into the light pen available through *The Micro User* and which senses whether it is pointing at the screen. The article describes the Procedure to change to get around this shortcoming.

★ ★ ★

JUST a message to say I'm glad to see you on Micronet. Electronic mail has so many advantages for those like myself who if they manage to organise pen, paper, envelope and stamp then forget to post the letter!

On the subject of an adventure page – a nice idea, but how do you avoid getting hints when you don't want them? – **H. Hanley, Norwich.**

★ ★ ★

I HAVE just received my November issue of The Micro User and I'm still convinced that next to my Beeb this is the best buy I've made!

I particularly appreciate the down to earth approach which you adopt and find Mike Cook's pages of especial interest.

Do you think he could come up with some (polite) suggestions for those of us who have graduated from Atom to Beeb?

Is there any way the Atom can be linked to the Beeb? Extra memory? Second processor? – **J.G. Swift.**

● Mike Cook says it can be done, but he really doesn't think there's a lot to gain from it.

● ***Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.***

```
   10DEFPROCpron
   20CLS
   30FORA=11TO12
   40PRINTTAB(12,A)CHR$141CH
R$134CHR$136"Printing"
   50NEXT
   60VDU28,0;0;:REM Zero Tex
t Window
   70VDU2
   80VDU23,1,0;0;0;0;:REM Sw
itch off cursor
   90ENDPROC
  120DEFPROCproff
  130VDU3
  140VDU26:REM Restore Text
Window
  150VDU23,1,1;0;0;0;:REM Re
store cursor
  160CLS
  170ENDPROC
```

Listing I

simply enter PROCpron or PROCproff instead of VDU2 or VDU3. (Listing I.)

For anyone who already has a large program and does not wish to edit all the VDU2 and VDU3 calls, I also enclose a machine code patch which will detect any VDU2 call, clear the screen and set up a zero text window. (Listing II.)

```
   10A%=?&20E+256*?&20F
   20FORA=0TO1
   30P%=&D01
   40[OPTA
   50CMP£2
   60BNEnext
   70LDA£12:JSRA%
   80LDA£28:JSRA%
   90LDA£0:JSRA%:JSRA%:JSRA%
:JSRA%
  100LDA£2:JSRA%
  110.next
  120CMP£3
  130BNEnone
  140LDA£3:JSRA%
  150LDA£26
  160.none
  170JMPA%
  180]
  190NEXT
```

Listing II

A VDU3 call will reset the text window to the default. The patch is presently assembled at &D01.

Anyone with a disc drive will need to use another section of RAM. To activate the patch use ?&20E =1 : ?&20F=&D. In this case the cursor remains, although it could be removed with extra lines of code if required.

BREAK will deactivate the patch, as will POKEing the original contents back into &20E and &20F. These values may vary for different operating systems, and should be determined for individual machines. Incidentally, if storing the program anywhere other than &D01, the activation addresses should be changed accordingly. – **Peter Vasey, South Shields.**

Tiny Problem

HERE is our computer game idea: The computer is the dog and you are the frog.

The dog chases the frog, but you can get away by jumping over the dog and score points by jumping on a lily pad – about 100 points. You have four lives.

It has three screens and on each screen there gets less and less lily pads. On the third lot you have three lily pads – two green and one red which is home and scores 500 points.

You have 1000 units of energy to get through each lot.

We do not know how to write this game in Basic. Please could someone do it for us? – **Sharon King, age 8½, Paul King, age 6½.**

● Is there anyone out there who could program Sharon and Paul's idea for them? If so, get in touch with Micro User!

Structure strictures

MAY I reply to Christopher Hester's points and questions about structured programming (Micro User, October, 1983).

First, a general point. BBC Basic is not fully structured and it is true that complete adherence to the rules of good structure produces more procedures than one would choose.

I can give details of methods for getting the procedures in a reasonable order, perhaps soon in this journal. But at least when searching for a procedure one is searching for a properly named chunk of code with a beginning and end.

Most of Mr Hester's problems arise because of faults in BBC Basic which one hopes are just part of the long history of the development of languages.

A change of graphics mode should be possible in a procedure. It is a problem the software writers did not solve properly. The same comment applies to any other action command. They should work in procedures or in the main program equally well.

The reasons why GOTO and GOSUB are still included are complex and different. GOSUB is there for compatibility with old practices and possibly as a cover for technical shortcomings.

No modern language would be designed with GOSUB included for its own sake.

GOTO has the same justifications and one more. There are certain complex situations, such as the need to cope with an error discovered at a deeply nested point in a program, when a GOTO is the simplest way to cope. Used carefully by an expert there is no problem.

But as a teacher I know from bitter experience the trouble which GOTO causes. For students and beginners it should be completely avoided and even Mr Hester need not use it for the input routine he mentions. A standard structure for handling keyboard input is:

```
REPEAT
(get the data)
UNTIL (data is correct)
```

It would be easy for people to list their personal preferences but the concepts of SP are the result of wide consensus and more than a decade of hard won progress.

BBC Basic is good enough (only just) to enable its users to work in a sensible modern conceptual framework within which problems can be solved and tasks completed in efficient, readable ways.

Any reader is free to reject or accept this philosophy, but I do get upset when I see the old discredited methods being taught to unsuspecting children or other newcomers to computing. Why does Mr Hester think SP was invented? – **Roy Atherton, Director, Bulmershe Computer Education Centre, Reading.**

Answer in stereo

READING of the continuing interest in tape loading problems I thought that some readers might benefit if I related my own experiences in this troublesome area.

For my first attempts at tape loading I used my "quality" mains powered stereo tape deck with built in amplifier (output impedance 10kohms, input 560 kohms).

Acorn's letter in the October issue of Micro User showed that I had no chance of success. I then bought a cheap portable and now, being as wise as the Beeb Owl, asked for a demo to be sure that it worked.

The dealer promptly loaded up Planetoids – no problem.

→

MICROMAIL

From Page 133

On my return home however I discovered that there was no record level control and the auto level was too high. Programs unloaded to tape could not be loaded back onto the computer.

My way round that one was to re-record onto my mains recorder adjusting the record level appropriately.

Well, as you might guess all this infuriated my wife. The tape deck went back to the dealer and we bought a pair of disc drives.

If you promise to keep a secret from more understanding wives I have now discovered that if I record onto the stereo deck via the microphone input (low impedance) and carefully output via the speaker channels (6w) there's no trouble at all!

It's just as well Acorn were a little slow in writing to you. – **Lex Harrison, Edinburgh.**

Missing

THANKS for a great magazine but in your listing for your date of birth program in the October issue you missed a line out and the program would not run. There should have been a line number 35 PROCinit. – **Matthew Searle, age 11.**

- Quite correct Matthew – the missing line is on the floor somewhere in our art room!

Mystery

CAN you help me with two problems?

Why does shift and break produce the message:

BBC Computer
Searching
File not Found
BASIC
>_

While disassembling the Basic I ROM I found the command LINE. Could you please tell me what this does? – **Ben Dessau, Rottingdean.**

- On machines fitted with a DFS, pressing break and shift, then releasing break while maintaining shift causes the micro to *EXEC a file on the disc with the title !BOOT (provided the disc has been prepared with *OPT 4 3).

Often !BOOT simply chains in a menu program.

If you haven't got a DFS, you obtain the message you described on OS1.2. On OS0.1 you simply obtain a normal break.

*LINE and *CODE allow you to jump to your own machine code routine pointed at by a vector at &200,&201 (the user vector USERV).

*CODE is followed by two parameters which are placed in the X and Y registers. It is entered with the accumulator equal to zero.

*LINE is followed by a string, the start of which is vectored by X and Y. It is entered with the accumulator equal to 1.

Crash catcher

TO make your BBC Micro print the line at which an error occurs when it crashes, the following can be used (with OS 1.0 or later):

```
   10 ON ERROR REPORT:PRINT"
 at line";ERL: PROCinsert("L
IST"+STR$(ERL)+CHR$13):STOP
10000 DEFPROCinsert(I$):REPE
AT:A%=138:X%=0:Y%=ASC(LEFT$(
I$,1)):CALL&FFF4:I$=RIGHT$(I
$,LEN(I$)-1):UNTIL I$="":END
PROC
```

– **David Stonebanks, Stevenage.**

And finally, with tongue firmly in cheek . . .

Trevor's micro finally makes the grade . . .

Dear Trev,

I've finally done it. I've summoned up the nerve to take my micro down to the Nice Byte and get my new ROM fitted. So, instead of being just a 0.1 plebian, I am now the proud owner of a 1.2 Operating System.

Mind you, it was a nerve wracking experience. First of all I had to get my Beeb downstairs to the car. This entailed a half hour struggle with the tangle of wires and flexes that had built up over the past six months. It was while I was doing this that I came across a plug that actually didn't do anything! I've no idea how it got there or what it was supposed to do.

Andrea was nice enough to drive me and my Beeb down to the shop though she couldn't help showing her nature. By habit I sat in the front of the car.

"Shouldn't you be sitting in the back, dear?" she asked with an air of innocence. "I mean didn't they just change the law or something?"

I ignored the remark and she referred to my British Broadcasting Micro as "the little bundle" all day.

When I got to the Nice Byte she came in with me and demanded that the salesman explain exactly what was going to happen. He waxed eloquent and made it sound like a brain transplant.

"Never mind the micro", she said pointing at me, "give him a new ROM".

The salesman gave me a fellow sufferer kind of look and told me that if I waited it would be "all over" in 10 minutes.

Well, it was the longest ten minutes of my life. I swear that as soon as my micro disappeared into the back of the shop I started having withdrawal symptoms. You know, anxiety, blurred vision, sweating. Without thinking about it I started pacing up and down.

"Don't worry, dear, I'm sure that they'll use an anaesthetic", Andrea murmured, working her way through the books, complaining about the prices.

It was a relief when my micro arrived back on the counter.

"Is it a boy or a girl?" Andrea asked the confused assistant.

"It's an OS 1.2 and that'll be £11", he replied.

At this point Andrea, who hadn't realised that I was going to have to pay, started to become a cross between M. Thatcher and H. Ogden, both at their best (or do I mean worst). I can't remember exactly what it was that she said (I was in a corner pretending to look at some software).

I do, however, distinctly remember her mentioning the "Sale of Goods Act, 1893" and Esther Ransom in the same breath.

Anyway, it did no good. I took out my cheque book and paid. As I walked out of the door the salesman grinned wickedly and yelled out: "See you when you get Basic Two".

Andrea's still asking me just what Basic Two is and I'm running out of lies. I wish that I'd stayed with my 0.1 ROM. I enjoyed playing the cassette bugs fix!

Yours in adversity, ***Bob***

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CS2 - BANDIT. At last! A good quality slot machine program at a realistic price. For only £2.99 you will receive a one arm bandit program with all the features of the pub machines. This one has many win modes that coupled with the random application of holds gives this game the big machine feel. After you have won you then go on to gamble or collect. If you win on the gamble you progress to the BANDIT feature to possibly win yet more money. Of course you are given the nudge facility, excellent colour graphics and full sound effects. The only thing you do not get is real money.

CS3 - NURSERY RHYMES. Especially for the very young members of the family. This suite of programs is designed for the pre - school child. The nursery rhyme tune is played with the words appearing across the top of the screen two lines at a time whilst a full colour animated picture is displayed. The colours can be changed by pressing the function keys. Five rhymes are provided, Hickory Dickory Dock, Polly put the kettle on, See Saw Margery Daw, Humpty Dumpty and Ba Ba Black Sheep - all for £2.99

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Santa's Saucer listing

From Page 75

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```
10 REM (c) MICRO USER 1983
20 VDU 23,240,1,0,0,0,1,1,60,114
    ,23,241,72,200,80,112,208,240
    ,115,4,23,242,0,0,15,17,33,194
    ,4,2,23,243,0,0,128,0,0,0,0
    ,0,23,244,241,112,62,3,0,0,0
    ,0,23,245,248,0,31,255,63,15
    ,7,3,23,246,2,4,248,192,192
    ,128,192,248
30 VDU 23,224,64,172,84,16,16,255
    ,16,16,23,225,0,0,0,239,239
    ,0,239,239,23,226,0,3,30,126
    ,31,0,0,0,23,227,126,255,66
    ,66,255,255,90,0,23,228,0,192
    ,120,126,248,0,0,0,23,229,0
    ,0,1,3,6,14,25,54,23,230,112
    ,224,128,196,238,52,8,168
40 VDU 23,231,35,3,3,3,3,15,123
    ,195,23,232,88,160,0,0,0,192
    ,60,6,23,233,42,19,10,12,62
    ,246,255,15,23,234,128,0,0,0
    ,0,0,0,252,23,235,7,7,7,15,19
    ,34,4,8,23,236,255,255,254,54
    ,27,9,18,36,23,237,0,56,37,61
    ,37,37,56,0
50 VDU 23,238,0,198,41,41,41,41
    ,198,0,23,239,0,68,124,84,84
    ,68,68,0
60 VDU 23,247,60,60,60,24,126,189
    ,189,60,23,248,0,119,68,70,84
    ,119,0,0,23,249,0,119,37,37
    ,37,39,0,0,23,250,0,119,68,102
    ,68,68,0,0
70 DIM HO%(4)
    :DIM HI%(4,1)
    :DIM HI$(4)
    :FOR N%=0TO 4
    :HI$(N%)="BBC"
    :HI%(N%,1)=100
    :NEXT
80 ON ERROR GOTO 910
90 PROCINSTRUCTIONS
100 ENVELOPE 1,1,-1,-1,-1,100,100
    ,100,0,0,0,-1,V1%,0
    :ENVELOPE 2,1,0,0,0,10,10,10
    ,-1,-1,-1,-1,V1%,0
    :ENVELOPE 3,1,0,0,0,1,1,1,-1
    ,-1,-1,-3,V1%,0
110 MODE 1
    :VDU 5,23;8202;0;0;0;
120 SC%=0
    :DEL%=0
    :TP%=0
    :CO%=FALSE
    :BAPRES%=20
    :MILOC%=0
    :PLRG%=10
    :MH%=2
130 PROCINIT
140 FOR N%=0TO 3
    :VDU 19,N%,0,0,0,0
    :NEXT
    :PROCSCREEN
    :IF TP%>0TP%=TP%-1
    :DEL%=DEL%-1
    :PROCDEL
150 IF MIA%PROCMI
160 PROCSMO
    :IF MIA%PROCMI
170 PROCTM
    :PROCMI
    :IF PR%PROCPRMO
    ELSE PROCDELAY(3)
180 IF CO%GOTO 530
    ELSE IF Q%=0GOTO 230
    ELSE IF PRES%=0GOTO 280
190 IF LIG%<>0LIG%=LIG%-1
    :IF LIG%=0PROCWINDOW(-1)
200 IF INKEY (-74)T=TIME
    :REPEAT UNTIL TIME =T+30
    :REPEAT UNTIL INKEY (-74)
210 GOTO 150
220 DEF PROCPLSET
    :MIA%=0
    :RP%=1200
    :RP2%=500
    :ENDPROC
230 VDU 4
    :CLS
    :IF DEL%/TP%<0.6GOTO 260
    ELSE PRINT TAB(6,10);"A successfu
    l delivery run !"
240 PRINT ''TAB(5);"Bonus points
     100 x ";PRDES%;" = ";100*PRDES%
    :SC%=SC%+100*PRDES%
    :BAPRES%=BAPRES%-1-1*(BAPRES%=14)
250 PROCTUNE(1)
    :PROCDELAY(200)
    :CLS
    :VDU 5
    :GOTO 130
260 PRINT TAB(7,10);"Hard luck chum
     - you waste"''TAB(7);"almost
     as many presents as"''TAB(13);
    "you deliver !"
270 PROCTUNE(2)
    :PROCDELAY(100)
    :GOTO 530
280 VDU 4
    :PRINT TAB(8,10);"Idiot - you've
     run out of"''TAB(14);"presents"
    :GOTO 270
290 DEF PROCSMO
    :GCOL 0,0
    :MOVE X%,Y%
    :VDU 226,227,228
    :X%=X%+16*(INKEY (-98))-16*(
    INKEY (-67))-16*(X%<0)+16*(X%>994
    )
    :Y%=Y%-16*(INKEY (-73))+16*(
    INKEY (-105))+16*(Y%>800)-16*(Y%<
    400)
    :MOVE X%,Y%
    :GCOL 0,2
    :VDU 226,227,228
    :IF INKEY (-99)AND PR%=0PROCPRDR
300 ENDPROC
310 DEF PROCPRDR
    :PR%=-1
    :PRX%=X%+36
    :PRY%=Y%-32
    :SOUND &11,1,255,25
    :ENDPROC
320 DEF PROCPRMO
    :MOVE PRX%,PRY%
    :VDU 18,0,0,224,8,225
    :PRY%=PRY%-16
    :MOVE PRX%,PRY%
    :VDU 18,0,1,224,8,18,0,3,225
    :PO%=POINT(PRX%,PRY%-36)
    :PO2%=POINT(PRX%+32,PRY%-36)
    :IF PO%<>0OR PO2%<>0GOTO 330
    ELSE ENDPROC
330 MOVE PRX%,PRY%
    :VDU 18,0,0,224,8,225
    :PR%=0
    :PROCPREZ
    :IF PRY%>300DEL%=DEL%-1
    :PROCDEL
    :ENDPROC
    ELSE IF PO%=1AND PO2%=1AND HO%(
    INT (PRX%/210))<4AND HO%(
    INT (PRX%/210))<>0SOUND 3,2
    ,100,1
    :PROCDEL
    :PROCSCORE(100)
    :PROCPRNO(PRX%)
    :ENDPROC
340 PROCWINDOW(PRX%)
    :DEL%=DEL%-1
```

SENTINEL
X7

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You'll have to be an all-rounder because some of the games will test your intellect, some your general knowledge and one your skill with computers. But they're all fun and I guarantee you've never seen anything like them before.

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Warning: These programs are sold according to Twig Systems Software terms of trade and conditions of sale, copies of which are available on request.

Santa's Saucer listing

From Page 136

```
    :PROCDEL
    :ENDPROC
350 DEF PROCINIT
    :MH%=MH%+1
    :LIG%=0
    :LIG2%=0
    :MIA%=-1
    :PRES%=BAPRES%
    :X%=0
    :Y%=424
    :PR%=0
    :YS%=10
    :XS%=30
    :PROCMISET
    :PRDES%=0
    :FOR N%=0TO 4
    :HO%(N%)=RND(3)
    :PRDES%=PRDES%+HO%(N%)
    :NEXT
    :@%=PRDES%
    :MILOC%=MILOC%-1-10*(MILOC%=-1)
    :PLRG%=PLRG%-1-1*(PLRG%=5)
360 IF MILOC%=0MILOC%=1
370 ENDPROC
380 DEF PROCMISET
    :MIA%=-1
    :MI%=1170+XS%
    :MI2%=254+YS%
    :MI3%=1170
    :MI4%=254
    :MIS%=XS%
    :MIS2%=YS%
    :MILOC2%=RND(MILOC%)
    :IF MILOC2%=1MI4%=MI2%
390 ENDPROC
400 DEF PROCDELAY(X)
    :TIME =0
    :REPEAT UNTIL TIME =X
    :ENDPROC
410 DEF PROCHOUSE(X,Y)
    :MOVE X,Y
    :GCOL 0,2
    :DRAW X,Y+100
    :PLOT 85,X+200,Y
    :PLOT 85,X+200,Y+100
    :GCOL 0,3
    :DRAW X+100,Y+150
    :PLOT 85,X,Y+100
    :CH=RND(2)-2
    :CH=-25*(CH)-125*(CH=0)
    :GCOL 1,1
    :MOVE X+CH,Y+100
    :DRAW X+CH,Y+150
    :PLOT 85,X+CH+50,Y+100
    :PLOT 85,X+CH+50,Y+150
420 MOVE X+50,Y+50
    :GCOL 0,0
    :DRAW X+50,Y+82
    :PLOT 85,X+82,Y+50
    :PLOT 85,X+82,Y+82
    :GCOL 0,0
    :MOVE X,Y+32
    :PRINT ;HO%(X/210)
    :ENDPROC
430 DEF PROCSCREEN
    :FOR N%=0TO 840STEP 210
    :PROCHOUSE(N%,0)
    :NEXT
440 GCOL 0,1
    :FOR N%=200TO 208STEP 4
    :MOVE 1120,N%
    :DRAW 1280,N%
    :NEXT
    :MOVE 1152,264
    :VDU 229,230,233,234,10,8,8
    ,8,8,231,232,235,236
450 PROCTM
    :COLOUR 1
    :VDU 4
    :PRINT "Presents : ";PRES%
    :PRINT '"Score : ";SC%
    :PRINT TAB(17,1);"%age delivered
     : 100"
    :MOVE 0,896
    :DRAW 1280,896
    :MOVE 512,1008
    :DRAW 512,944
    :DRAW 1248,944
    :DRAW 1248,1008
    :DRAW 512,1008
460 VDU 5,19,1,7,0,0,0,19,3,1,0
    ,0,0,19,2,6,0,0,0
    :ENDPROC
470 DEF PROCTM
    :IF NOT MIA%ENDPROC
    ELSE MOVE 1170,254
    :GCOL 0,0
    :PLOT 1,XS%,YS%
    :YS%=RND(10)+3
    :XS%=-(40-YS%)
    :GCOL 0,1
    :MOVE 1170,254
    :PLOT 1,XS%,YS%
    :ENDPROC
480 DEF PROCMI
    :IF NOT MIA%GOTO 610
    ELSE IF MILOC2%=1GOTO 730
490 GCOL 0,0
    :MOVE MI%,MI2%
    :DRAW MI3%,MI4%
    :MI%=MI%+MIS%
    :MI3%=MI3%+MIS%
    :MI2%=MI2%+MIS2%
    :MI4%=MI4%+MIS2%
500 MOVE MI%,MI2%
    :GCOL 0,1
    :PMX%=POINT(MI%-4,MI2%+4)
    :IF PMX%=0DRAW MI3%,MI4%
    :ENDPROC
    ELSE IF PMX%=-1AND RND(PLRG%)=1
    PROCPLSET
    :ENDPROC
    ELSE IF PMX%=-1SOUND 0,3,6,1
    :PROCMISET
    :ENDPROC
    ELSE IF PMX%<>2GOTO 600
510 GCOL 0,0
    :MOVE X%,Y%
    :VDU 226,227,228
    :FOR M%=0TO 5
    :SOUND &10,2,4,1
    :FOR N%=1TO 3
    :GCOL 0,N%
    :MOVE X%+N%*4,Y%+N%*4
    :VDU 237,238,239
    :GCOL 0,0
    :MOVE X%+N%*4,Y%+N%*4
    :VDU 237,238,239
    :NEXT
    :NEXT
520 VDU 4
    :PRINT TAB(10,10);"Failure !!
     The end of"''TAB(10);"Christmas
     as we know it"
    :CO%=TRUE
    :PROCTUNE(2)
    :PROCDELAY(100)
    :VDU 21
    :ENDPROC
530 VDU 6,22,7,23;8202;0;0;0;
    :IF SC%>HI%(4,0)GOTO 570
540 CLS
    :FOR N%=0TO 1
    :VDU 129,157,135,141
    :PRINT TAB(10,N%);"** ** Top
     5 ** **"
    :NEXT
    :PRINT 'TAB(8);"Name      Score
      %age"
    :FOR N%=0TO 4
    :PRINT TAB(8,N%*2+5);N%+1;")";HI$
    (N%);TAB(18,N%*2+5);HI%(N%,0);
    TAB(25,N%*2+5);HI%(N%,1)
    :NEXT
```

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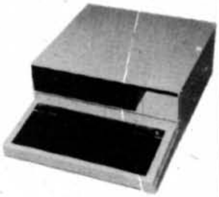

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Santa's Saucer listing

From Page 139

```
550 PRINT '''''"      Press <SPACE>
     to play again"''"    or <ESCAPE>
     to see instructions"
    :REPEAT PRINT TAB(0,5);CHR$ (
    RND(7)+128)
    :UNTIL INKEY (-99)
    :IF V%<>0PROCTUNE(0)
560 GOTO 110
570 N%=-1
    :REPEAT N%=N%+1
    :UNTIL SC%>HI%(N%,0)
    :IF N%=4GOTO 580
    ELSE FOR M%=3TO N%STEP -1
    :HI$(M%+1)=HI$(M%)
    :HI%(M%+1,0)=HI%(M%,0)
    :HI%(M%+1,1)=HI%(M%,1)
    :NEXT
580 FOR M%=0TO 1
    :PRINT TAB(6,10+M%);
    :VDU 129,157,134,141
    :PRINT "You are in the top 5
       ";CHR$ 156
    :NEXT
    :PRINT ''"Please enter your name
     : - ";
    :*FX15,0
590 VDU 31,32
    :INPUT A$
    :HI$(N%)=LEFT$(A$,7)
    :HI%(N%,0)=SC%
    :HI%(N%,1)=INT ((DEL%/TP%)*100)
    :GOTO 540
600 MOVE PRX%,PRY%
    :VDU 18,0,0,224,8,225
    :PR%=0
    :PROCMISET
    :PROCPREZ
    :DEL%=DEL%-1
    :PROCDEL
    :ENDPROC
610 GCOL 0,0
    :MOVE RP%,RP2%
    :VDU 240,241,242,243,10,8,8
    ,8,8,244,245,246
    :RP%=RP%-32
    :RP2%=RP2%+RND(9)-5+4*(RP2%>Y%)-4
    *(RP2%<Y%)
    :GCOL 0,1
    :MOVE RP%,RP2%
    :VDU 240,241,242,243,10,8,8
    ,8,8,244,245,246
620 IF POINT(RP%,RP2%-16)=2OR
    POINT(RP%,RP2%-28)=2OR POINT(RP%
    ,RP2%-36)=2OR POINT(RP%,RP2%-48)=
    2OR POINT(RP%+48,RP2%-64)=2
    OR POINT(RP%+24,RP2%)=2GCOL 0
    ,0
    :MOVE RP%,RP2%
    :VDU 240,241,242,243,10,8,8
    ,8,8,244,245,246
    :GOTO 510
630 IF RP%<=0GCOL 0,0
    :MOVE RP%,RP2%
    :VDU 240,241,242,243,10,8,8
    ,8,8,244,245,246
    :PROCMISET
640 IF RND(10)=1GOTO 650
    ELSE ENDPROC
650 GCOL 0,1
    :SOUND &12,V%,40,0
    :SOUND &10,V%,3,10
    :MOVE RP%,RP2%-32
    :PLOT 21,0,RP2%-32
    :GCOL 0,0
    :PLOT 21,RP%,RP2%-32
    :IF Y%-32<RP2%-32AND Y%>RP2%-32
    AND X%<RP%GOTO 510
660 ENDPROC
670 DEF PROCSCORE(I%)
    :VDU 4
    :SC%=SC%+I%
    :PRINT TAB(8,2);SC%
    :VDU 5
    :ENDPROC
680 DEF PROCPREZ
    :VDU 4
    :PRES%=PRES%-1
    :PRINT TAB(11,0);PRES%;" "
    :VDU 5
    :ENDPROC
690 DEF PROCWINDOW(I%)
    :GCOL 0,1
    :IF I%=-1GCOL 0,0
    :I%=LIG2%
    ELSE SOUND 3,3,0,1
    :LIG%=10
    :LIG2%=I%
700 I%=INT (I%/210)
    :I%=I%*210
    :MOVE I%+50,200
    :VDU 248,249,250
    :MOVE I%+50,50
    :DRAW I%+50,82
    :PLOT 85,I%+82,50
    :PLOT 85,I%+82,82
    :MOVE I%+50,82
    :VDU 18,0,0,247
    :MOVE I%+50,200
    :VDU 248,249,250
    :GCOL 0,3
    :MOVE I%+200,100
    :DRAW I%+100,150
    :PLOT 85,I%,100
    :ENDPROC
710 DEF PROCDEL
    :TP%=TP%+1
    :VDU 4
    :DEL%=DEL%+1
    :PRINT TAB(34,1);INT ((DEL%/TP%)*
    100);"  "
    :VDU 5
    :ENDPROC
720 DEF PROCPRNO(I%)
    :Q%=Q%-1
    :I%=INT (I%/210)
    :HO%(I%)=HO%(I%)-1
    :GCOL 0,2
    :MOVE I%*210,32
    :PRINT ;HO%(I%)+1
    :GCOL 0,0
    :MOVE I%*210,32
    :PRINT ;HO%(I%)
    :MOVE I%*210+HO%(I%)*50+36,32
    :VDU 18,0,1,224,8,18,0,3,225
    :ENDPROC
730 GCOL 0,0
    :MOVE MI%,MI2%
    :DRAW MI3%,MI4%
    :MI%=MI%+MIS%
    :MI3%=MI3%+MIS%
    :MI4%=MI4%-MH%*(MI2%<Y%)+MH%*(MI2
    %>Y%)
    :MI2%=MI2%-MH%*(MI2%<Y%)+MH%*(MI2
    %>Y%)
    :GOTO 500
740 DEF PROCINSTRUCTIONS
750 VDU 22,7,23;8202;0;0;0;
    :FOR N%=0TO 1
    :VDU 129,157,135,141
    :PRINT TAB(10,N%);"Santa's Saucer
    "
    :NEXT
    :PRINT ''" With the modern day
     population,Santa ishard pressed
     to deliver to the chimneys"
760 PRINT "of the world,so he has
     dispensed with   the traditional
     reindeer,and hired a    saucer
     to help with his deliveries."
770 PRINT " The international reindee
    r union has   formed a action
     group to prevent Santa  doing
     his rounds.Some of them with
          homicidal tendencies have
```

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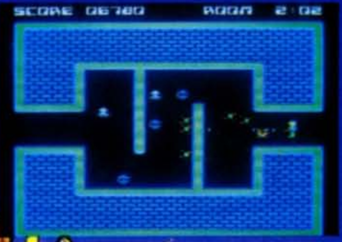

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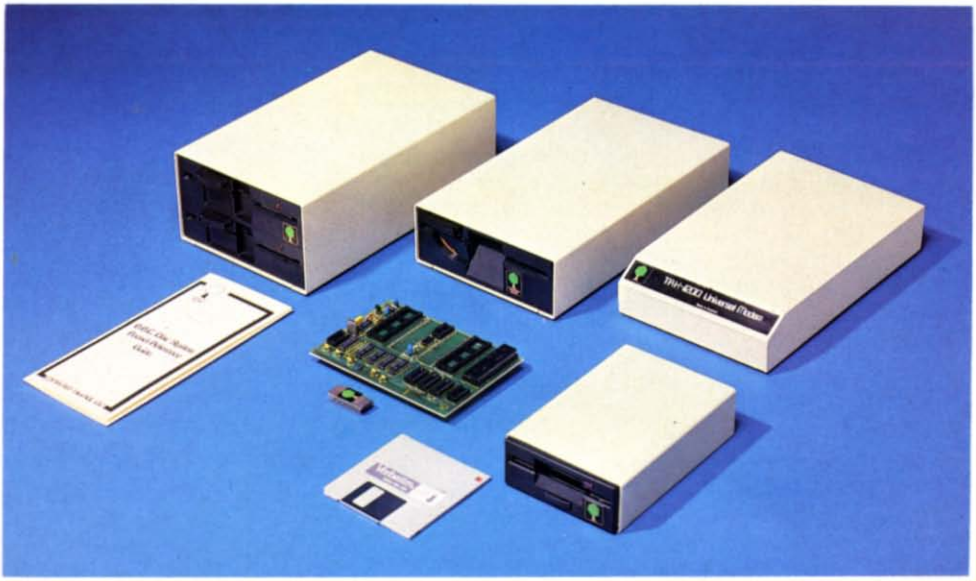

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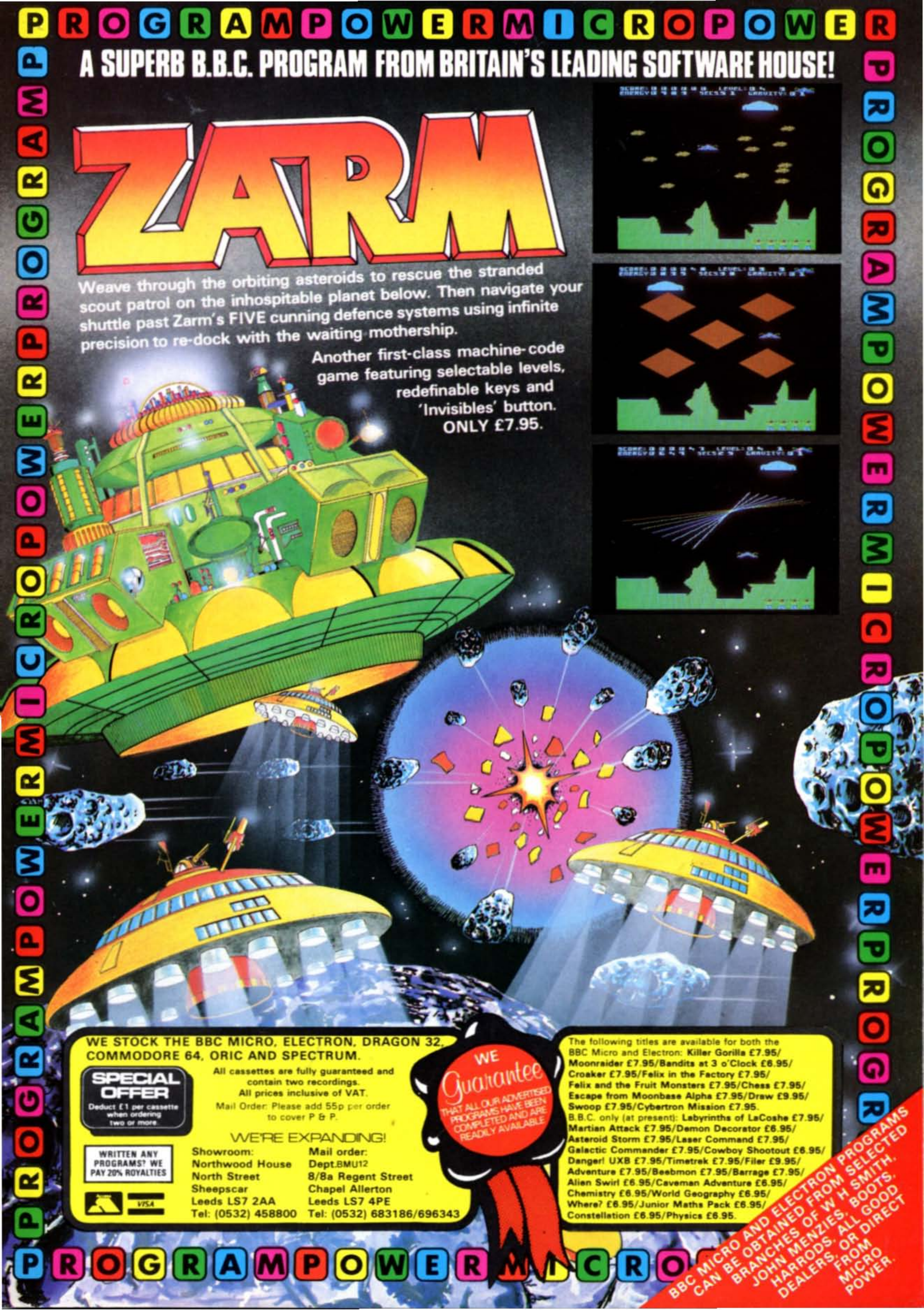
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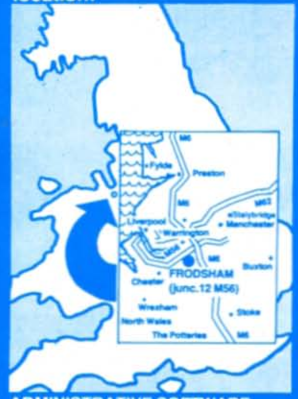

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Santa's Saucer listing

From Page 142

```
     taken to      shooting at Santa
     with an AA gun,and he"
780 PRINT "needs help to pilot the
     ship while he   makes up the
     parcels."
790 PRINT '"Move the ship using
     :"'TAB(20);"Z X"'TAB(21);"/
      <SPACE> to  dropa present ,
     and <RETURN> to freeze."
800 PRINT ''"** ** Press SPACE BAR
     to continue ** **"
    :REPEAT UNTIL INKEY (-99)
810 CLS
    :PRINT "Input sound level 1=loud"
    'TAB(18);"2=medium"'TAB(18);
    "3=off : ";
    :*FX15,0
820 A=GET
    :IF A>48AND A<52VDU A
    :A=A-48
    ELSE GOTO 820
830 IF A=1V%=-15
    :V1%=126
    ELSE IF A=2V%=-10
    :V1%=80
    ELSE V%=0
    :V1%=0
840 PRINT ''"** ** Press SPACE BAR
     to start ** **"
    :REPEAT UNTIL INKEY (-99)
    :IF V%<>0PROCTUNE(0)
    :ENDPROC
    ELSE ENDPROC
850 DEF PROCTUNE(I%)
    :IF I%=0RESTORE 890
    ELSE IF I%=1RESTORE 880
    ELSE IF I%=2RESTORE 900
860 READ L%
    :FOR N%=1TO L%
    :READ A%,B%
    :IF A%=0SOUND 1,0,0,B%
    ELSE SOUND 1,V%,A%,B%
870 NEXT
    :TIME =0
    :REPEAT UNTIL TIME =100
    :ENDPROC
880 DATA 5,149,6,157,6,165,6,169
    ,12,149,24
890 DATA 17,145,4,0,2,145,4,0,2
    ,145,8,0,2,145,4,0,2,145,4,0
    ,2,145,8,0,2,145,6,157,6,129
    ,8,137,3,145,16
900 DATA 7,53,8,37,8,25,8,65,8,57
    ,4,53,4,57,16
910 IF ERR =17GOTO 80
    ELSE MODE 7
    :REPORT
    :PRINT " at line ";ERL
```

This listing is included in this month's cassette tape offer. See order form on Page 99.

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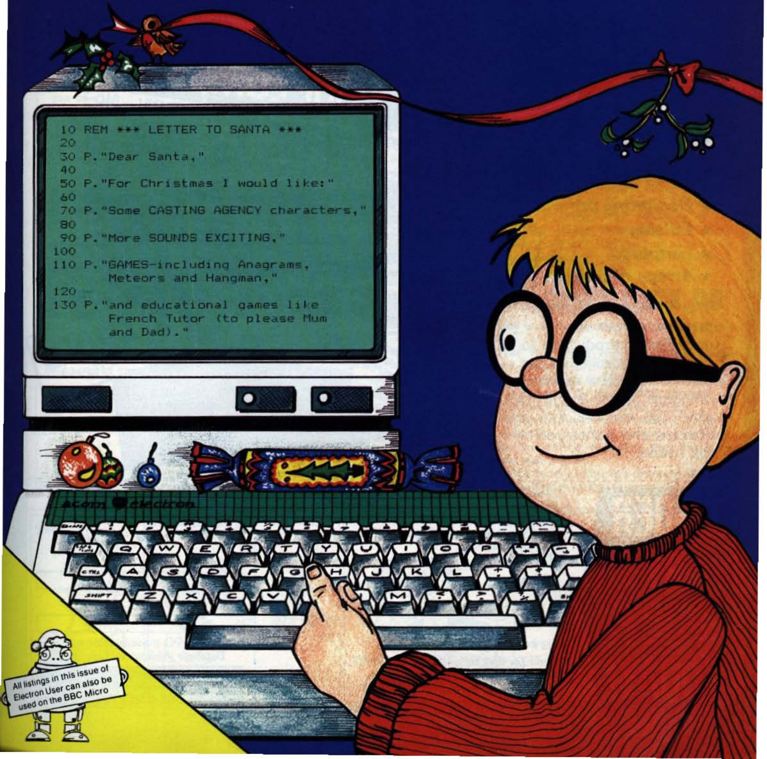
electron user

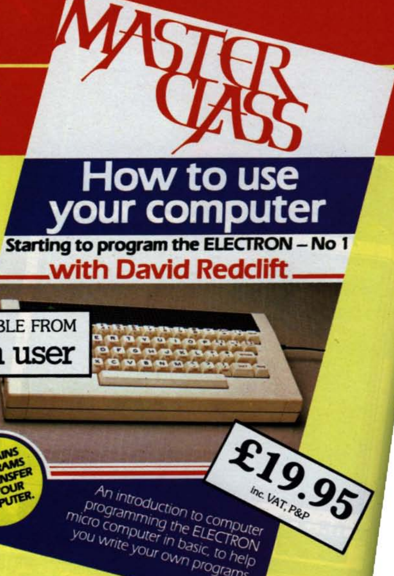
Vol. 1 No. 3 December 1983



```
10 REM *** LETTER TO SANTA ***
20
30 P."Dear Santa,"
40
50 P."For Christmas I would like:"
60
70 P."Some CASTING AGENCY characters,"
80
90 P."More SOUNDS EXCITING,"
100
110 P."GAMES-including Anagrams,
     Meteors and Hangman,"
120
130 P."and educational games like
     French Tutor (to please Mum
     and Dad)."
```

All listings in this issue of Electron User can also be used on the BBC Micro

The easy way to learn how to program your Electron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WELSH TAKE THE LEAD WITH ELECTRON ADD-ONS

Acorn admits problems

WITH a candour far too often lacking from the world of microcomputing, Acorn today admitted it is having problems with the production of Electrons.

However, despite strong rumours to the contrary from informed sources, it denied the ULA was giving difficulties.

Said an Acorn spokesman, "We are meeting production targets, but the targets are too low".

He went on to explain that demand was totally unexpected, exceeding anything previously experienced in the field of microcomputing.

Commented one dealer, "You'd think they would have learnt from the problems with the BBC Micro".

THE Welsh seem to have the edge in the potentially massive Electron add-on market.

Following the news that AB Electronics of Gwent will be producing Electrons at the rate of 4,000 a week from January comes word of two more Welsh firms producing products for Acorn's latest micro.

The first is the Hobbit, a floppy tape system for recording programs which is being adapted for use with the Electron.

Produced by Ikon Computer Products of Dyfed, the Hobbit is both faster and more reliable than a conventional tape recorder and promises to be the first mass storage system available for the Electron.

More hardware for Xmas

A proven success with the BBC Micro, it will offer Electron owners the performance normally associated with disc drives.

Meanwhile, in Cardiff, Sir Computers is producing two hardware add-ons for the Electron in time to catch the Christmas rush.

The first is a combined A to D (joystick) and Centronics printer interface which will considerably increase the scope of the Electron.

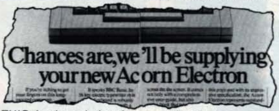
Sir will also be marketing an 8 ROM expansion board which will allow extra chips to be added to the micro.

This will allow instant loading of alternative languages and other chip-based software, making the Electron easily the most powerful machine of its class.

New trio from A&F

A&F Software of Manchester has added three more titles to its Electron range.

The trio, Cylon Attack, Chuckie Egg and Pharoah's Tomb, are new versions of the successful BBC Micro programs specially adapted for the Electron.



Chances are, we'll be supplying your new Acorn Electron

THIS is the ad that is causing red faces at W.H. Smiths. For, like all Electron dealers, the chain just cannot get enough of them.

The ad proclaims: "We're the only major store that stocks it". But "stock" isn't quite the right word.

Said a Smith's spokesperson, "As soon as we get the Electrons in we sell them. We would like to have more, but Acorn is unable to meet the demand".

So what were my chances of getting an Electron from Smiths?

"That's rather a naive question. We are in the hands of Acorn.

"And you must remember that our advertising is planned well in advance – this one's turned out to have rather a sting in the tail".

electron user

Electron User welcomes program listings and articles for publication. Listings should be accompanied by cassette tape or disc.

Send to:
Electron User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

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Disc drive race on

THE race is on to develop disc drives for the Electron.

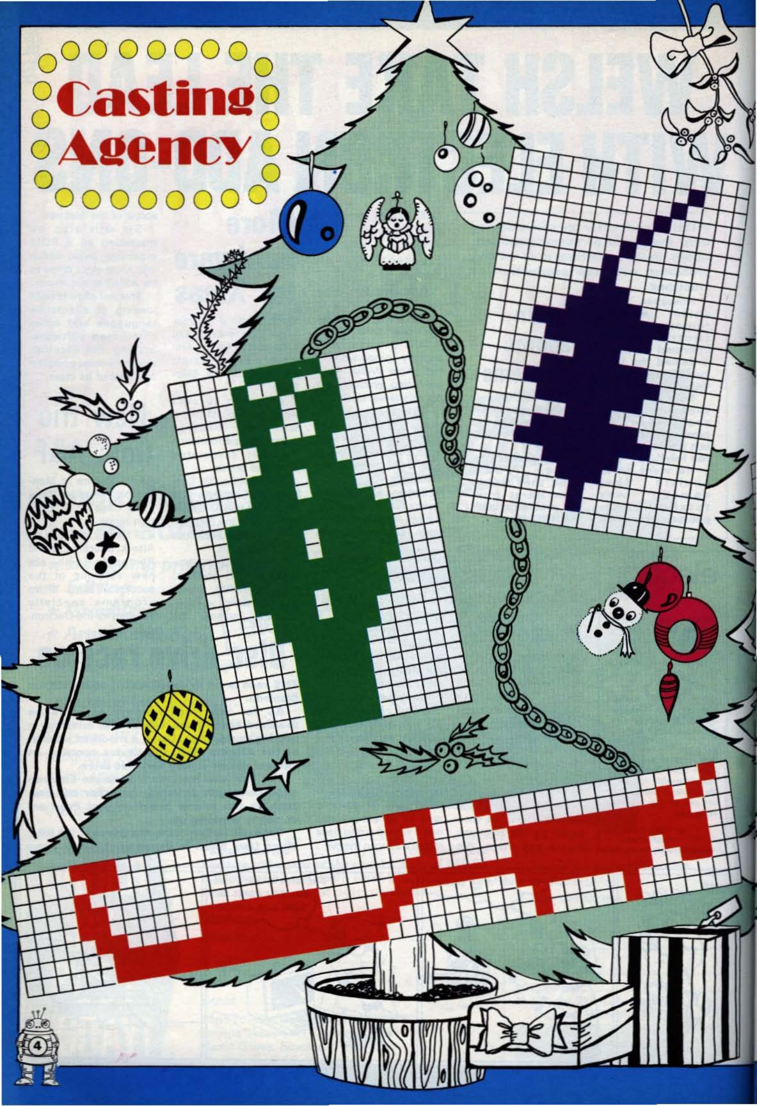
So far the front runners seem to be Bradford-based Pace, whose disc interface is nearing completion. Using a modified version of the Amcom DFS, the device contains an integral power supply and disc drive.

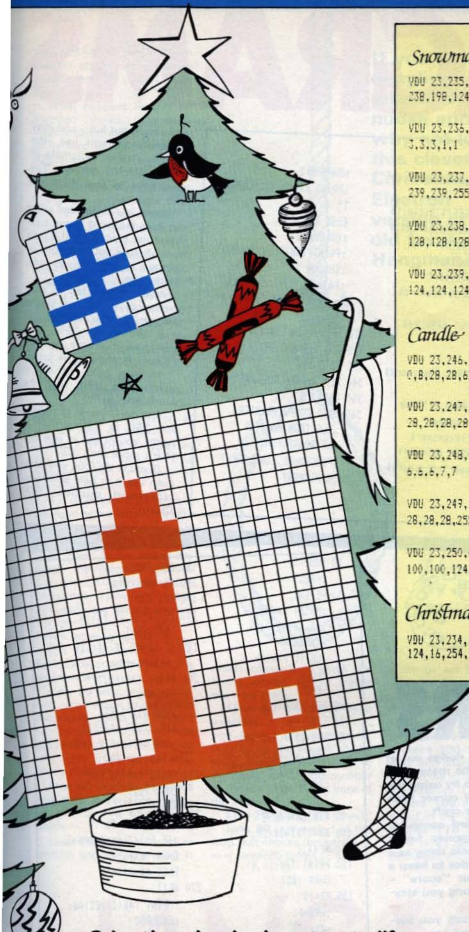
The unit also features a duplicate Electron edge connector to allow for other add-ons, such as the printer interface that Pace are currently working on.

Pace will be launching the drives at the BBC Micro User Show in December.

THE MICRO KID
MY MUM'S SO SILLY...
SHE SAYS THAT IF I CARRY ON.. I'LL START TO LOOK LIKE A MICRO!

Casting Agency





Snowman

```
VDU 23.235,124.146,
238.198,124.124.238

VDU 23,236.0.1.3.
3,3,3,1,1

VDU 23,237.238.255.255.
239,239,255,255,239

VDU 23,238.0.0,128.
128,128.128,0,0

VDU 23.239,238.254,124,
124,124,124,124,124
```

Candle

```
VDU 23,246.0.0.0.
0,8,28,28,62

VDU 23.247,62.28.8,
28,28.28,28.28

VDU 23.248.0.0.6.
6.6.6,7,7

VDU 23,249,28,28.28,
28.28,28,255,255

VDU 23,250.0.0.124,
100,100,124,224,224
```

Christmas Tree

```
VDU 23.234,16,56.16,
124,16,254,16,56
```

Reindeer & Sleigh

```
VDU 23,228.224,100.128.
192,192,96,63,31

VDU 23,229.0,0,0,
0.255,255,255.255

VDU 23,230,7,5,1,
3.7,12,248.240

VDU 23,231,16.8.7.
7,255,7,2,2

VDU 23.232.0,1,255.
255.253,252,8,8

VDU 23,233.32,62.128,
192.192,192,0,0
```

Holly

```
VDU 23.240.0.0.0.
1.2.4.8.16

VDU 23.241.0.0.128.
0.0.0.0.0

VDU 23,242,0.0.0.
1,0,0,0,1

VDU 23.243,16,56,124,
255,254,56,254,255

VDU 23,244.0.0.0.
1.0.0.0,0

VDU 23,245.254,56,254.
255,124,56,16,16
```

Bring these handy characters to life in your own Electron programs with these ready-to-go listings. There'll be more next month!

HAVE you a favourite character you would like to see in this monthly feature in Electron User? Send your drawing of the character, together with the VDU23 statement, to: Shape Dictionary, Electron User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

ANAGRAMS

```
100 REM ANAGRAMS
110 REM **INITIALIZE**
120 READ numwords%
130 A%=RND(-TIME )
    :DIM word$(numwords%)
    :MODE 5
140 FOR count%=1TO numwords
    %
    :READ word$(count%)
    :NEXT
150 REM **SELECT WORD**
160 thisword$=word$(
    RND(numwords%))
    :mixword$=""
    :bitleft$=thisword$
    :count%=LEN (thisword$)
170 REM **MIX WORD UP**
180 REPEAT
190 rnd=RND(count%)
200 mixword$=mixword$+
    MID$(bitleft$,rnd
    ,1)
210 bitleft$=LEFT$(bitleft$
    ,rnd-1)+RIGHT$(bitleft$
    ,LEN (bitleft$)-rnd)
220 count%=count%-1
230 UNTIL bitleft$=""
240 IF thisword$=mixword$
    THEN 160
250 REM **INPUT ANSWER**
260 CLS
270 COLOUR 1
    :PRINT TAB(5,5)mixword$
280 COLOUR 2
    :INPUT TAB(0,8)"Type
     in your answer"
    TAB(5,11)myanswer$
290 REM **CHECK ANSWER**
300 IF myanswer$=thisword$
     CLS
    :COLOUR 2
    :PRINT TAB(5,10)"CORREC
    T"
    ELSE CLS
    :COLOUR 1
    :PRINT TAB(5,10)"WRONG"
    :COLOUR 3
    :PRINT ''"The correct
     answer"''"to "mixword$
    ''"is "thisword$
310 delav$=INKEY$ (500)
320 REM **START AGAIN**
330 GOTO 160
340 REM **DATA FOLLOWS**
350 DATA 10
360 DATA COMPUTER,MICRO
    ,ELECTRON,MONITOR
    ,KEYBOARD,FUNCTION
    ,PROCEDURE,LOOP,INPUT
    ,STATEMENT
```

IT'S simple but fun – and easy to play. Anagrams has your Electron flashing a jumble of letters on the screen. You then have to sort them out into a word.

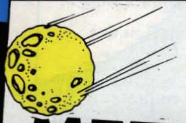
When you've decided what the decoded word is you type it into the Electron and it tells you whether you are right or wrong. It then gives you another go.

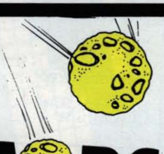
When you get fed up with the words we've put in the program (or you want to put in something like XEBEC for your know-it-all little nephew) it's easy to change the game.

All you have to do is rewrite line 360 with the words you want.

And don't forget to change line 350 to the number of words you've got in line 360 (if it's more than 10).

If you're devious you could even use it to help solve your crossword puzzles. GOK CLOUD.





METEORS

PICTURE it. You're travelling in space and your ship's detector screens warn you that a meteor storm is approaching.

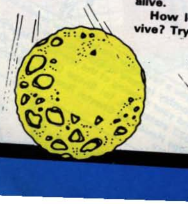
It's so big and going so fast that you don't stand a chance of getting out of its path.

You just have to let it overtake you and hope that you can dodge out of the way of the meteors.

You do this by using the left and right cursor keys to guide your craft.

Your inboard computer (a bit of a games freak) treats the whole thing as a joke and decides to keep a record of your "score" – that is, how long you stay alive.

How long can you survive? Try it and see.



```
 10 MODE 5
    :PROCI
 30 REPEAT
    :PRINT TAB(5.0)
    INT (TIME /10)
    :PROCS
    :UNTIL FINISH
 40 PROCE
    :END
 60 DEF PROCI
 70 TIME =0
 80 VDU 23.1.0:0:0:0:23
    .224.24.60.60.60.60
    .66.129.129.23.225
    .24.60.126.126.126
    .126.60.24
 90 FINISH=FALSE
100 A$=STRING$(20." ")
110 *FX4.1
120 PRINT TAB(10.8)
    CHR$ (B%)
130 P%=10
    :NP%=P%
    :A%=135
    :B%=224
    :D%=225
    :E%=31
    :F%=8
    :G%=136
    :H%=137
140 ENDPROC
150 DEF PROCS
160 K%=INKEY (0)
170 *FX15.0
180 IF K%=G% IF P%<>0
     NP%=P%-1
190 IF K%=H% IF P%<>19
     NP%=P%+1
200 PRINT TAB(P%.7)" "
    :P%=NP%
    :VDU 31.P%.F%
    :IF ((USR (&FFF4)
     AND &FFFF)DIV &100)=12
    9 FINISH=TRUE
220 PRINT TAB(P%.F%)
    CHR$ (B%)
230 A$=""
    :FOR I%=Z% TO 19
    :IF RND(7)=1 A$=A$+
    CHR$ (D%)
    ELSE A$=A$+" "
270 NEXT
    :PRINT TAB(Z%.E%)A$:
    :ENDPROC
340 DEF PROCE
350 *FX4.0
360 PRINT 'TAB(31.0) "YOUR
     SCORE WAS ":INT (
    TIME /10)
370 *FX15.0
380 END
```

HANGMAN

If you're just dangling around at a noose end, why not key in this clever Christmas Electron version of that old favourite, Hangman?

By PETE DAVIDSON

HANGMAN is the Electron version of the old children's game – and it's just as much fun to play.

What happens is that the Electron "thinks" of a word. Next it calculates the number of letters in the word and displays the same number of dashes on the screen.

Then it's up to you to try and guess the hidden word. You pick a letter that you think might be in it and press that letter's key.

If you've guessed rightly the micro will replace a dash or dashes with the letter. If you're wrong a part of the gallows or man will appear and the mistaken letter will appear in the "tried" list.

The eighth mistake you make will hang the man and you've lost the game.

The principle the program works on is very simple. The hidden word is selected at random from an array.

When a letter is typed in, the Electron looks at the hidden word to see if it contains that letter.

If it does then that letter is replaced with a space. If it isn't another part of the gallows is drawn.

As given in the listing the words the Electron chooses are all concerned with Christmas. However, these can easily be altered so that the game changes with a child's growing vocabulary.

The following is a more detailed description of how the program works:

Line 30 selects the mode, calls a procedure to define the characters, seeds the random number generator, dimensions the array of words to give room for 500 words and, finally disables the cursor.

Line 40 reads in the words and sets a variable, *numword%*, to the number of words.

Line 50 picks a word at random and keeps a copy. It resets colour 0 to black (for future words). C%=0 makes the rope black.

Line 60 initialises four variables:

err% is the number of errors, *length%* is the length of the word, *move%* is the number of the move, *spc%* is the number of spaces to be put in front of the dashes.

Line 70 sets up the screen.

Line 80 is the start of the loop that checks the letters. It sets *correct%* to FALSE so that it can be set to TRUE if the letter is in the word. The program then waits for a letter to be pressed.

Line 90 increments the move counter.

Lines 100-150 check the letter and change *correct%* to TRUE if the letter is in the word and displays it on screen.

Line 160 prints incorrect letters in the "tried" column.

Line 170 checks if the word is all spaces and calls PROCwon if it is. If not it adds one more to the error count and calls PROChang.

Provided fewer than eight errors have been made the program returns to line 80 for another go.

Line 180. Before reaching this line either PROCwon or PROChung will have been executed. Both then call PROCanothergo and this line accepts the answer.

Lines 190-220. PROCwon changes everything that is coloured black to the background colour and prints the gallows on the screen.

As the gallows are now in the background colour, only the man is shown. C% is also set to 5 so the man's neck shows up. PROCanothergo is also called in this procedure.

Lines 230-250. PROChang jumps into the subroutine from lines 340-430. Exactly where it jumps to depends on how many errors have been made.

Lines 260-300. PROChung prints the correct word on the screen and calls PROCanothergo.

Lines 310-330. PROCanothergo prints the question on the screen.

Lines 340-430. This subroutine calls the various procedures to draw the pieces of the gallows and man. It is entered at various points depending on the value of *err%* in line 240.

Lines 440-510 cause the various parts to be drawn on screen.

Lines 520-700 define the characters.

Line 1000 contains the list of words that the Electron picks from. It's here that you can put in your own words by just typing them in after the DATA statement. Each word must be separated by a comma. You can't have more than 500 of them.

Line 5000 is the final piece of data, EOF. Your own data must come before this line which must not be removed.

HANGMAN LISTING

From Page 7

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```
  10 REM HANGMAN
  20 REM (C)ELECTRON USER
  30 MODE 2
     :PROCdefine
     :X%=RND(-TIME )
     :DIM word$(500)
     :VDU 23;8202;0;0;0;
  40 count%=0
     :REPEAT
     :count%=count%+1
     :READ word$(count%)
     :UNTIL word$(count%)=
     "EOF"
     :numwrd%=count%-1
  50 word$=word$(RND(numwrd%))
     :copy$=word$
     :VDU 19,0,0,0,0,0
     :C%=0
  60 err%=0
     :length%=LEN (word$)
     :move%=1
     :spc%=(20-length%)/2
  70 COLOUR 130
     :CLS
     :COLOUR 1
     :PRINT TAB(14,1)"TRIED"
     :COLOUR 8
     :PRINT TAB(spc%,26)
     STRING$(length%,"-")
  80 correct%=FALSE
     :COLOUR 4
     :PRINT TAB(3,29)"This
      is move ";move%
     :COLOUR 12
     :PRINT '"   PRESS A LETTE
     R";
     :letter$=GET$
  90 move%=move%+1
 100 FOR count%=1TO length%
 110 IF letter$<>MID$(word$
     ,count%,1)
     THEN 150
 120 word$=LEFT$(word$,count%-
     1)+" "+MID$(word$,count%+
     1)
 130 COLOUR 5
     :PRINT TAB(spc%+count%-1
     ,26)letter$
 140 correct%=TRUE
 150 NEXT
 160 IF correct%=FALSE
     THEN COLOUR 7
     :PRINT TAB(16,3+2*err%)le
     tter$
 170 IF word$=STRING$(length%
     ," ")
     THEN PROCwon
     ELSE IF correct%=
     ELSE err%=err%+1
     :PROChang
     :IF err%<8
     THEN 80
 180 get$=GET$
     :IF get$="Y"
     THEN 50
     ELSE IF get$<>"N"
     THEN 180
     ELSE CLS
     :END
 190 DEF PROCwon
 200 VDU 19,0,2,0,0,0
     :C%=5
     :GOSUB 340
     :COLOUR 11
     :VDU 7
     :PRINT TAB(0,26)"
       WELL DONE    "''"
                    "
 210 PROCanothergo
 220 ENDPROC
 230 DEF PROChang
 240 ON err%GOSUB 410 ,400
     ,390 ,380 ,370 ,360
     ,350 ,340
 250 ENDPROC
 260 DEF PROChung
 270 COLOUR 14
     :PRINT TAB(4,26)"YOU'RE
      HUNG"
 280 VDU 7
     :COLOUR 9
     :PRINT '"   THE WORD
      WAS "'SPC ((18-LEN (copy
     $))/2)copy$;SPC ((18-
     LEN (copy$))/2)
 290 PROCanothergo
 300 ENDPROC
 310 DEF PROCanothergo
 320 COLOUR 12
     :PRINT '"   ANOTHER
      GO?  ";
 330 ENDPROC
 340 PROCFEET
 350 PROCLEGS
 360 PROCARMS
 370 PROCBODY
 380 PROCHEAD
 390 PROCTOP
 400 PROCUPRIGHT
 410 PROCBASE
 420 IF err%=8
     THEN PROChung
 430 RETURN
 440 DEF PROCFEET
     :COLOUR 1
     :VDU 31,5,16,235,236
     ,237,238
     :ENDPROC
 450 DEF PROCLEGS
     :COLOUR 4
     :VDU 31,6,11
     :FOR I%=1TO 2
     :VDU 234,234,10,8,8
     :NEXT
     :FOR I%=1TO 3
     :VDU 231,232,10,8,8
     :NEXT
     :ENDPROC
 460 DEF PROCARMS
     :COLOUR 5
     :VDU 31,5,6
     :FOR I%=1TO 2
     :VDU 233,9,9,233,10
     ,8,8,8,8
     :NEXT
     :FOR I%=1TO 3
     :VDU 231,9,9,232,10
     ,8,8,8,8
     :NEXT
     :COLOUR 3
     :VDU 239,9,9,240
     :ENDPROC
 470 DEF PROCBODY
     :COLOUR 5
     :VDU 31,6,6
     :FOR I%=1TO 5
     :VDU 233,233,10,8,8
     :NEXT
     :ENDPROC
 480 DEF PROCHEAD
     :COLOUR 3
     :VDU 31,6,3,227,228
     ,10,8,8,229,230
     :COLOUR C%
     :VDU 10,8,8,232,231
     :ENDPROC
 490 DEF PROCBASE
     :COLOUR 0
     :VDU 31,1,20
     :FOR I%=1TO 10
     :VDU 224
     :NEXT
     :ENDPROC
 500 DEF PROCUPRIGHT
     :COLOUR 0
     :VDU 31,2,2
     :FOR I%=1TO 18
     :VDU 224,10,8
     :NEXT
     :ENDPROC
 510 DEF PROCTOP
     :COLOUR 0
     :VDU 31,1,1
     :FOR I%=1TO 10
     :VDU 224
     :NEXT
     :VDU 31,6,2,226,225
     :ENDPROC
 520 DEF PROCdefine
 530 VDU 23,224,255,195,165
     ,153,153,165,195,255
 540 VDU 23,225,128,192,128
     ,192,128,192,128,192
 550 VDU 23,226,3,1,3,1,3
     ,1,3,1
 560 VDU 23,227,31,31,255
     ,31,33,127,243,254
 570 VDU 23,228,248,248,255
     ,248,132,254,207,127
 580 VDU 23,229,124,124,119
     ,59,28,15,15,15
 590 VDU 23,230,62,62,238
     ,220,56,240,240,240
 600 VDU 23,231,240,240,240
     ,240,240,240,240,240
 610 VDU 23,232,15,15,15
     ,15,15,15,15,15
 620 VDU 23,233,255,239,199
     ,171,239,239,255,255
 630 VDU 23,234,255,255,255
     ,255,255,255,255,255
 640 VDU 23,235,0,0,1,63
     ,127,255,254,120
 650 VDU 23,236,240,240,248
     ,252,252,248,120,120
 660 VDU 23,237,15,15,31
     ,63,63,31,30,30
 670 VDU 23,238,0,0,128,252
     ,254,255,127,30
 680 VDU 23,239,240,248,124
     ,126,213,85,85,85
 690 VDU 23,240,15,31,62
     ,126,171,170,170,42
 700 ENDPROC
1000 DATA CHRISTMAS,SANTA
     ,HOLLY,ANGEL,SLEIGH
     ,TINSEL,CRACKERS,PUDDING
     ,TURKEY,SNOW,FAIRY,DECORA
     TIONS,PRESENTS,GIFTS
     ,PARTIES,TRIFLE,FAMILY
     ,CARDS
5000 DATA EOF
```

This listing is included in this month's cassette tape offer. See order form on Page 99 of The Micro User.

Et voila!
acorn electron

FRENCH TUTOR

DID you think that your micro was limited to Basic English? Well with our French Tutor the Electron starts to speak French.

The micro will put a sentence on the television screen and you have to type in the correct answer.

If you get it wrong it'll tell you and display what it should have been.

At the end you get a score, and the chance to do it all again.

And you're not limited to French. You can use any language you like by changing the DATA statements.

But let's start with French. Over to you.

Or do I mean vous?

```
10 REM ** FRENCH VERBS
   **
20 REM (C)ELECTRON USER
30 CLS
   : PRINT TAB(5) "In
    this test, you must"
40 PRINT TAB(5) "copy
    the punctuation marks
    "
50 PRINT TAB(5) "exactly,
    because if you "
60 PRINT TAB(5) "don't,
    the computer, being
    "
70 PRINT TAB(5) "literal-m
   inded, will think "
80 PRINT TAB(5) "you have
    made a mistake!"
90 PRINT
   : PRINT TAB(5) "N.B.
    'You' is translated
    "
100 PRINT TAB(5) "as 'Vous'
     (2nd person plural)."
110 PRINT
    :PRINT TAB(5) "Unfortun
    ately, all accents
     "
120 PRINT TAB(5) "have
     to be omitted."
130 PRINT
140 REPEAT
150 LET T=0
160 FOR K=1 TO 21
170 READ E$, F$
180 PRINT "WHAT IS '"E$
    "'?"
190 INPUT X$
200 IF X$=F$
    THEN PRINT "C'EST JUSTE
    !"
    : LET T=T+1
210 PRINT
220 IF X$<>F$
    THEN PRINT "FAUX! VOICI
     LE MOT JUSTE: "F$
    : SOUND 1,-15,89,10
230 PRINT
240 NEXT K
250 PRINT "YOUR SCORE IS:
     ";T;" OUT OF  21"
260 PRINT
    :PRINT
270 RESTORE
280 UNTIL FALSE
290 DATA "I don't know"
    , "Je ne sais pas"
300 DATA "When will you
     come?","Quand viendrez
    -vous?"
310 DATA "I will write
     to you","Je vous ecrir
    ai"
320 RESTORE
330 DATA "I like French
     wine","J'aime bien
     le vin francais"
340 DATA "How much is it?"
    , "C'est combien?"
350 DATA "I'm waiting for
     an answer","J'attends
     une reponse"
360 DATA "What time is
     it?", "Quelle heure
     est-il?"
370 DATA "It's six o'clock"
    , "Il est six heures"
380 DATA "What colour is
     it?", "C'est de quelle
     couleur?"
390 DATA "I'm going out
     now", "Je sors mainten
    ant"
400 DATA "I'm going to
     the airport", "Je
     vais a l'aeroport"
410 DATA "Hurry up, I'm
     late!","Depechez-vous,
     je suis en retard!"
420 DATA "Is it far?"
    , "Est-ce que c'est
     loin?"
430 DATA "Go away!", "Allez
    -vous en!"
440 DATA "I have no money"
    , "Je n'ai pas d'argent
    "
450 DATA "I'm going home"
    , "Je rentre chez moi"
460 DATA "I'll be there
     in an hour", "Je serai
     la dans une heure"
470 DATA "Will you wait?"
    , "Attendrez-vous?"
480 DATA "What's your name?
    ", "Comment vous appele
    z-vous?"
490 DATA "Shall I see you
     again?","Vous reverrai
    -je?"
500 DATA "Until the next
     time..", "A la prochai
    ne fois.."
510 END
```

The new boy from Acorn already has a gang of playmates.

The Acorn Electron, Britain's most exciting new home micro, already has a range of software programs specially designed for it by Acornsoft, makers of software for the BBC Micro.

There are six mind-boggling games, two programming languages, two exciting graphics cassettes, a home educational program and a personal money management program.

All of which will soon help familiarize you with the Electron and show you how to get the maximum enjoyment out of it straight from the word go.

Of course, we'll be constantly designing new software to help you fully realise the Electron's limitless potential.

You'll find all the programs featured here, plus the full

acorn electron

The Electron. The new boy from Acorn.

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Snapper
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Meteors
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Starship Command
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Monsters
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Creative Graphics
acorn electron
Graphs and Charts
acorn electron
Personal Money Management
acorn electron
Tree of Knowledge
acorn electron
LISP
acorn electron
FORTH

range of programs for the BBC Micro, available at selected W.H. Smith branches and at your local Acorn stockist. (To find out where they are call 01-200 0200.)

Alternatively, you can send off for the Acornsoft Electron or BBC Micro catalogue, by writing to:

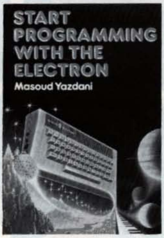
Acornsoft, c/o Vector Marketing, Denington Estate,
Wellingborough, Northants
NN8 2RL.

ACORNSOFT

The friend that lets you down

THIS is the book that you'll find, along with the User Guide, in the box your Electron comes in.

You'll get some idea of its style from the blurb on the back which says: "This book is the friend you need to hold your hand through a bewildering new world".



Start Programming with the Electron
Masoud Yazdani

However you can't judge a book by its cover, it's what's inside that counts. Sadly, it carries on using patronising phrases like "your journey through computer land".

This would be acceptable if the content made up for the style. But it doesn't.

It starts off with procedures in chapter one, goes on to functions and conditional branching in chapter two and eventually deals with INPUT in chapter seven.

On the way there is a detour into Turtle graphics and the statement that machine code is "the jargon phrase for strings of noughts and ones".

During these wild lurches through computer land the level of presentation varies badly.

For instance, variables are explained well, yet the treatment of expressions is far too terse for a book aimed at beginners.

And the appearance of recursion in chapter one of such a book is mistaken, to say the least.

Acorn are to be congratulated for attempting to provide "a gentle introduction" to the Electron to supplement the User Guide.

Unfortunately this book fails to do so.

Peter Green

ASSEMBLING THE ABOUT MACHINE

FOR my money one of the nicest things about the Electron is its in-built assembler.

And now there's an equally nice book that teaches you how to use the assembler to talk to the micro in its own language – machine code.

People seem to shy away from assembly language, as it has a reputation for being hard to learn.

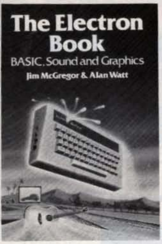
I've always maintained that it is more complex than difficult. If it were explained properly it wouldn't appear too formidable.

Now Ferguson and Shaw have made my point beautifully in the 13 chapters of "Assembly Language Programming on the Electron".

Each chapter is short and well illustrated, the diagrams adding something to the text rather than just being decoration.

The numerous short example programs are excellent, and these, combined with the lucid treatment of the subject, soon give a feeling of confidence.

There are three short summaries for you to check your progress and eight appendices – which are, for



Brain strain won't be in vain

The Electron Book
Basic, Sound and Graphics
Jim McGregor & Alan Watt

I HAVE little doubt that before long there will be a series of books all about learning BBC Basic on the Electron.

I doubt very much indeed whether many of them will be as good as The Electron Book, by McGregor and Watt.

It is quite simply excellent, the best book on a micro that I've read for a long time.

The first seven chapters are an introduction to the joys and complexities of BBC Basic.

Structured programming is introduced at an early stage, and the examples given are both illustrative and useful.

Each section is supported by a set of programming exercises which are an integral part of the book.

By the time you've worked through these you'll be able to program your Electron with ease and a fair measure of expertise.

The last four chapters deal with the Electron's sound and graphics capabilities – playing tunes from the keyboard, user defined graphics, animation. It's all there and more, dealt with expertly and thoroughly.

Not that it's an easy book to read. It assumes a certain amount of effort and intelligence on the part of the reader.

If you're not prepared to do the exercises which are a vital part of the book then you might find the later sections hard going.

Having said that, the exercises are interesting in themselves. They illustrate and add to the text.

Any brain strain is well worth the effort!

Given the above and 10 useful appendices you can see why I'm so impressed with this work. It has set a standard by which other books on the Electron will be judged.

Impressive.

Graham Parr

FACTS CODE

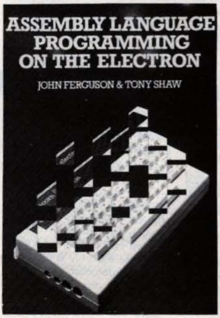
once, of use rather than just being afterthoughts.

This is a lovely little book. Its easy-to-read style and gradual progress give confidence to the learner while encouraging exploration.

So if you feel confined by Basic and want to know how to use your Electron's assembler, here's the one for you. A nice book.

Graham Parr

Assembly Language Programming on the Electron
John Ferguson & Tony Shaw


ASSEMBLY LANGUAGE PROGRAMMING ON THE ELECTRON
JOHN FERGUSON & TONY SHAW

Software Surgery

THE COLUMN THAT TAKES A LOOK INSIDE THE LATEST RELEASES

Your nightmares are landing...

SWOOP
Program Power

HAVE you ever had one of those nightmares where horrible creatures swoop at you out of the sky? Try as you like, you can't get away from them.

With Program Power's exciting new game Swoop you get the chance to get your revenge using your Electron.

You do this by controlling a laser base at the bottom of the screen. The birdmen are hovering in formation at the top bombing you. Not content with that, they peel off and strafe you.

All you can do to escape is either to blast them with your laser or dodge out of the way by moving left or right.

Even if you do avoid them they still cause problems because on landing they lay eggs which turn into landmines. Run into these when you're dodging left and right and **BANG!**

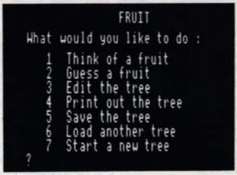
Happily you do have three lives – and you need them! And if you manage to shoot enough of the birdmen the eggs they've laid fade away. The trouble is that as soon as you've shot down one formation another one takes its place. And they start coming at you thick and fast.

It's a great game, enhanced by good graphics, nice sound effects and easily used controls. Fast and furious, it needs skill and good reactions to avoid the swarms that come at you as the game progresses. It's addictive – and a lot more fun than the nightmare.

Peter Bibby

Education is an extra

TREE OF KNOWLEDGE
Acornsoft



```
              FRUIT
What would you like to do :
      1  Think of a fruit
      2  Guess a fruit
      3  Edit the tree
      4  Print out the tree
      5  Save the tree
      6  Load another tree
      7  Start a new tree
?
```

The main menu of Tree of Knowledge

SAYING that Tree of Knowledge, the new program from Acornsoft, is an educational game could be the kiss of death. I mean, who wants a game that's educational?

It sounds like an impossibility – a contradiction in terms! However, Tree of Knowledge is both.

It's a program that shows how computers can organise facts, which must be educational. But it makes it all so interesting that you don't realise you're involved in learning.

Taken at its simplest level it's just a question-and-answer guessing game. Either you decide to "be" an object and the Electron must guess what it is or the micro is "it" and you must ask the questions until you can guess.

Of course, there has to be a list of objects to pick from, and the game supplies you with two.

On another level, you're learning how to set up lists of facts, or databases, and then using them to get the information that you want. At first, no doubt, you'll use the databases the game gives you but soon you'll want to create your own.

The program allows you to do this, simply and easily. It also lets you adjust the ones you already have, so you can throw in the odd unexpected object to catch out a know-it-all.

It's fascinating to use and can be anything from an intriguing game to an educational tool. The range is enormous. The Acornsoft cassette gives a database that can be used for A-Level biology students. I'm working on one using words from my daughter's school books. You're only limited by your imagination.

The instructions you get are complete and easy to follow and the whole package professionally produced.

If you're looking for a program that's both different and enjoyable then this is worth considering. Even if it is educational! **Eileen Young**

Shades of schooldays

THE GHOSTS OF GRUNLEY GRAMMAR
Magic Software

HAVE you ever wondered what became of the grammar schools when the comprehensives came along?

Well I know what happened to one of them, Grunley Grammar. It was shut up, forgotten, and left to decay, the only inhabitants the ghosts of its old teachers.

These ghosts are doomed to spend all eternity teaching spectral classes the subjects they refused to learn in their lifetime.

They would far prefer to teach, test and taunt a living child. And with Magic Software's cassette, The Ghosts of Grunley Grammar, they get the chance.

You take the part of a child who has foolishly entered the ghastly grammar school and fallen into the hands of its ghosts. You go from room to room and in each room the spirit of a master asks you three questions on his subject.

Should you fail any of them he gloatingly tells you the answer and back to the beginning you go. But only after the ghosts have taunted you about your stupidity!

It's amusing and becomes compulsive. All the usual school subjects are covered and there's a fair selection of questions. It's the kind of game that kids love – not just playing it themselves but also watching others make mistakes and get insulted. And they're learning all the time.

The program is fun and original. No doubt educationalists will say that it just teaches facts, not understanding, but that's just a quibble.

The program is amusing and addictive. In fact it's magic.

Trevor Roberts

SOUNDS.. EXCITING

SWALLOWED IN ONE GULP!

```
ENVELOPE 1,1,43,0,0,100,0,0,
126,0,0,-126,126,126
SOUND 1,1,17,18
```

```
ENVELOPE 1,6,126,0,0,206,
0,0,126,0,0,-126,126,126
SOUND 1,1,100,200
```

HAVE you tried using any of the sounds from "Sounds Exciting" yet? If you haven't, you should. It's fun and quite easy to do.

Let's take the factory sound from the second issue of *Electron User.*

Under the picture of the hammer and the machinery you have:

```
SOUND 0.1,1.50
ENVELOPE 1.5,1,20,8.200,0.0.
126,0.0,-126.126,126
```

To make the sound all you have to do is to type these letters and figures into your Electron. Don't forget to press Return!

The SOUND command and the figures following it tell the micro to make the noise. The ENVELOPE command with its attendant figures controls the type of noise made by the SOUND command.

One thing to make clear is that the ENVELOPE statement must be typed in before you type in the SOUND statement. This is fairly logical if you think about it, because for ENVELOPE to modify SOUND it must come before it.

Putting in the SOUND before the micro has been told which ENVELOPE to use just results in a puzzling silence.

Happily once you've entered the ENVELOPE statement the Electron will remember it and use it to modify the SOUND statement whenever it is used. However, don't expect it to be remembered after you've switched off!

You can also use the commands in a program but remember that there must be an ENVELOPE statement before you can use the SOUND command to make a noise.

Suppose we want to use the wailing bugs sound effect from issue one. All we do is put them in our program by giving them line numbers such as:

```
10 ENVELOPE 4.4,-1.1,0.20.20.
0,126.0.0,-126.126.126
20 SOUND 1,4,200.100
```

Notice that the ENVELOPE statement comes first. After this, however, you can use the SOUND command and it will automatically refer back to the correct ENVELOPE. You needn't use it again.

It can do this because each SOUND command is linked to its ENVELOPE by a label. The label is the number that comes immediately after the ENVELOPE command.

In the factory sound the number is 1, in the wailing bugs it is 4. You can have up to 16 ENVELOPES labelled in this way.

When the Electron comes across a SOUND command it checks to see whether there is an ENVELOPE label attached. This is the number that follows the first comma in the SOUND statement. It's 2 in the case of the factory noise, 4 for the wailing bugs. The micro then obeys the SOUND command but modifies the noise it makes by using the ENVELOPE with the same number.

Try the program on the right which contains the two ENVELOPE statements we've already come across. They are used to alter each of the SOUND commands we met earlier.

The wailing bugs SOUND command is modified by its own ENVELOPE statement and then by that of the factory sounds. Then the factory sound is modified by each of the ENVELOPE statements in turn.

```
10 ENVELOPE 4,4,-1,1,0
   ,20,20,0,126,0,0,-126
   ,126,126
20 ENVELOPE 1,5,1,20,8
   ,200,0,0,126,0,0,-126
   ,126,126
30 CLS
40 PRINT "PRESS A LETTER
    KEY"'"FOR THE NEXT SOUND
   "
50 A$=GET$
60 SOUND 1,4,200,100
70 A$=GET$
80 SOUND 1,1,200,100
90 A$=GET$
100 SOUND 0,1,1,50
110 A$=GET$
120 SOUND 0,4,1,50
```

All we've done is to change the labels on the SOUND commands so that they use both ENVELOPE statements.

By swapping the labels in the SOUND commands you can use any of the ENVELOPEs we've given you with any of the SOUNDs – sometimes with surprising results!

It's up to you and your Electron. Sounds exciting!

CAR STARTING

```
ENVELOPE 1,1,3,0,0,7,7,0,126,
0,0,-126,126,126
SOUND 0,1,63,84
```

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BBC

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